

Phoenix G2 series



Technical specification

		Phoenix G2
General		
Concept / form factor	Split Mount	
Frequency bands	2GHz*, 4GHz, U4GHz, L6GHz, U6GHz 7GHz, 8GHz, 11GHz, 13GHz, 18GHz, 23GHz, 38GHz	
Capacity	Up to 900 Mbps in 2+0 configuration	
	452 Mbps at 60 MHz 1024QAM 1+0	
Max modulation	1024QAM	
Configurations	1+0, 1+1 HSB/SD/FD, 1+0 Dual (Repeater), 2+0 (Layer 1 aggregation), 2+0 XPIC, 2+2** (with two IDUs)	
ACM and ATPC	Yes	
Channel bandwidth	ETSI: from 7 MHz, up to 56 MHz FCC: from 10 MHz, up to 60 MHz	
Ports		
Ethernet traffic	3x RJ-45	10/100/1000Base-T
	4x SFP	1000BaseSX/LX 2x SFP ports also work as Extension/Protection ports
Ethernet Management Access	1x 10/100/1000Base-T, RJ-45	
Serial port for configuration	USB B (alternative IP port)	
Flash memory port	USB A	
ODU port	2x N-Type Female	
DC power port	Single block 4 pole	

Ethernet	
Switch type	Managed Gigabit Ethernet Layer 2
Max frame size	64 to 2048 bytes, up to 10240 bytes for Jumbo mode***
MAC table	8192 entries; automatic learning and aging
Packet buffer	0.125 MB , non-blocking store&forward
Flow Control	802.3x
VLAN support	802.1Q, up to 4096 VLANs
QinQ (Double Tagging)	Yes, transparent
QoS	64 level DiffServ (DSCP) or 8 level 802.1p mapped in 4 prioritization queues with VLAN support, IPv6 Traffic Class
Synchronization	PTP 1588v2, SyncE*
Management features	
Protocols	via WEB GUI (HTTP**/HTTPS), CLI (Telnet/SSH), NMS (SNMP v1/v2c/v3), Serial interface (USB IP port)
Access	In-band (via VLAN) Out-of-band (115 kbps)
SNMP	Yes, SNMP traps (SNMPv1), MIB, SNMP v1/v2c/3
Element Management System (EMS)	Web based, HTTP**/HTTPS
Mechanical & Electrical	
Temperature Range / Humidity	-5 °C to +45 °C / 23 °F to 113 °F / 0% to 95%
Cooling	3-mode Fans built-in: On, Off, Auto (controlled by internal temperature)
Dimensions: HxWxD	½ width 1U (44 x 220 x 240 mm) / (1.73 x 8.66x 9.45 in)
Weight	2.2 kg / 4.9 lb
Max. power consumption	IDU only: <30W IDU + 2xODU: <180W
IDU-ODU connection	Maximum permissible IF cable attenuation at frequency 350 MHz = 15dB, N-Type connectors
DC port	-40.5V to -57V DC (conforms to ETSI EN 300 132-2)
IDU compliance	
Operation	ETSI EN 300 019, Part 1-3, Class 3.2
Storage	ETSI EN 300 019, Part 1-1, Class 1.2
Transportation	ETSI EN 300 019, Part 1-2, Class 2.3
Power	EN 300 132-2
Radio frequency IDU+ODU	EN 302 217-2-2
EMC	EN 301 489-1, EN 301 489-3
Safety	IEC 60950-1/EN 60950-1

* SyncE will be available in one of the next firmware releases

** HTTP will be automatically redirected to HTTPS

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Phoenix G2 RSL Thresholds and Capacity for ETSI channels

Bandwidth, MHz	Modulation	2GHz*	U4GHz	L6GHz	U6GHz	7GHz	8GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps	
		Guaranteed RSL Threshold, dBm											
7	4QAM StrongFEC	-91	-92,0	-89,5	-90,5	-87,5	-88,5	-88,5	-89,0	-89,0	-90,0	10	
	16QAM StrongFEC	-85	-86,0	-83,0	-84,0	-82,0	-82,0	-82,5	-82,0	-82,5	-83,5	20	
	32QAM StrongFEC	-82	-83,0	-80,0	-81,5	-79,0	-79,0	-79,0	-79,0	-79,0	-81,0	25	
	64QAM StrongFEC	-79	-80,0	-76,5	-78,0	-76,0	-76,5	-76,0	-76,0	-75,5	-76,0	-78,0	30
	128QAM StrongFEC	-75.5	-76,5	-72,5	-74,5	-73,5	-73,0	-73,0	-71,0	-72,5	-73,5	35	
14	4QAM StrongFEC	-88	-89,0	-87,0	-87,5	-85,0	-87,0	-87,0	-86,5	-87,0	-88,5	21	
	16QAM StrongFEC	-81.5	-82,5	-81,0	-81,0	-80,0	-79,5	-80,0	-80,5	-80,0	-81,5	42	
	32QAM StrongFEC	-78.5	-79,5	-77,5	-78,0	-76,5	-77,0	-77,0	-77,5	-77,5	-78,5	53	
	64QAM StrongFEC	-75.5	-76,5	-75,0	-75,5	-74,0	-74,0	-74,0	-74,0	-74,5	-75,5	63	
	128QAM StrongFEC	-72.5	-73,5	-72,0	-72,5	-71,0	-71,0	-71,5	-71,5	-71,5	-72,5	74	
	256QAM StrongFEC	-69.5	-70,5	-68,5	-69,5	-68,5	-67,5	-68,0	-68,0	-68,5	-69,5	85	
20	4QAM StrongFEC	-86.5	-87,5	-86,0	-86,0	-84,0	-85,0	-85,5	-85,0	-85,0	-86,0	30	
	16QAM StrongFEC	-80.5	-81,5	-79,0	-79,5	-79,0	-78,0	-79,0	-78,5	-78,5	-79,5	61	
	32QAM StrongFEC	-77.5	-78,5	-76,0	-77,0	-75,5	-76,0	-76,0	-76,0	-75,5	-76,5	76	
	64QAM StrongFEC	-74.5	-75,5	-73,0	-74,0	-72,5	-72,5	-73,0	-72,5	-72,5	-73,0	91	
	128QAM StrongFEC	-71	-72,0	-70,0	-71,0	-69,5	-69,5	-69,5	-70,0	-69,5	-69,5	107	
	256QAM StrongFEC	-68	-69,0	-67,5	-68,5	-66,5	-66,5	-66,5	-66,5	-66,5	-67,0	122	
	512QAM StrongFEC	-65	-66,0	-64,5	-65,0	-63,5	-62,5	-64,0	-63,0	-63,5	-63,5	137	
	1024QAM StrongFEC	-62	-63,0	-60,5	-61,0	-61,0	-59,5	-60,0	-60,0	-59,5	-59,5	152	
28	4QAM StrongFEC	-85	-86,0	-84,0	-84,5	-83,5	-84,0	-84,0	-84,0	-83,5	-84,5	43	
	16QAM StrongFEC	-78.5	-79,5	-77,5	-78,0	-78,0	-77,0	-77,5	-77,0	-77,5	-78,0	86	
	32QAM StrongFEC	-75.5	-76,5	-74,5	-75,5	-75,0	-74,0	-74,5	-74,0	-74,5	-75,5	108	
	64QAM StrongFEC	-73	-74,0	-71,5	-72,5	-72,0	-71,0	-71,5	-71,5	-71,5	-72,5	129	
	128QAM StrongFEC	-69.5	-70,5	-68,5	-69,5	-69,0	-68,0	-68,5	-68,5	-68,5	-69,5	151	
	256QAM StrongFEC	-67	-68,0	-66,0	-66,5	-66,0	-64,0	-65,5	-65,5	-65,5	-66,5	172	
	512QAM StrongFEC	-63.5	-64,5	-62,5	-63,5	-62,5	-60,5	-63,0	-62,0	-62,0	-62,5	194	
	1024QAM StrongFEC	-61	-62,0	-59,5	-60,0	-59,5	-58,0	-59,0	-59,0	-59,0	-59,5	216	
40	4QAM StrongFEC	-83.5	-84,5	-83,0	-83,0	-82,0	-82,0	-82,0	-82,0	-82,0	-83,0	61	
	16QAM StrongFEC	-77	-78,0	-76,0	-76,5	-76,0	-75,5	-75,5	-76,0	-75,5	-76,5	122	
	32QAM StrongFEC	-74.5	-75,5	-73,0	-73,5	-73,0	-72,5	-72,5	-73,0	-72,5	-73,0	152	
	64QAM StrongFEC	-71.5	-72,5	-70,0	-71,0	-70,0	-69,5	-69,5	-70,0	-69,5	-70,5	183	
	128QAM StrongFEC	-68.5	-69,5	-67,0	-68,0	-67,0	-66,0	-66,5	-67,0	-66,5	-68,0	214	
	256QAM StrongFEC	-65.5	-66,5	-64,0	-65,0	-64,5	-62,5	-63,5	-64,0	-63,5	-64,5	244	
	512QAM StrongFEC	-62.5	-63,5	-61,5	-62,0	-60,5	-59,5	-60,5	-60,0	-60,5	-61,0	275	
	1024QAM StrongFEC	-59.5	-60,5	-58,5	-58,0	-58,0	-56,0	-57,5	-57,0	-57,0	-57,5	305	
56	4QAM StrongFEC	-82	-83,0	-80,5	-81,5	-81,0	-80,0	-81,0	-80,5	-80,5	-81,0	87	
	16QAM StrongFEC	-75.5	-76,5	-74,0	-75,0	-74,5	-74,0	-74,5	-74,0	-74,0	-74,5	174	
	32QAM StrongFEC	-73	-74,0	-71,5	-72,0	-71,5	-71,0	-71,5	-71,0	-71,0	-71,5	217	
	64QAM StrongFEC	-70	-71,0	-68,5	-69,0	-68,5	-68,0	-68,0	-68,0	-68,5	-69,0	261	
	128QAM StrongFEC	-67	-68,0	-65,5	-66,5	-65,5	-64,5	-65,5	-65,5	-65,0	-66,0	304	
	256QAM StrongFEC	-64	-65,0	-62,0	-63,5	-63,0	-61,0	-62,0	-62,0	-61,5	-63,0	348	
	512QAM StrongFEC	-60.5	-61,5	-59,5	-60,5	-59,5	-57,5	-59,0	-58,5	-58,5	-59,5	392	
1024QAM StrongFEC	-57.5	-58,5	-56,0	-56,5	-56,5	-54,0	-56,0	-55,5	-55,5	-56,0	435		

* Preliminary data.

PhoeniX G2 RSL Thresholds and Capacity for FCC channels

Bandwidth, MHz	Modulation	2GHz*	U4GHz	L6GHz	U6GHz	7GHz	8GHz	11GHz	13GHz	18GHz	23GHz	Capacity, Mbps
		Guaranteed RSL Threshold, dBm										
10	4QAM StrongFEC	-89.5	-90.5	-88.5	-88.5	-87.0	-88.0	-88.0	-88.5	-88.0	-89.0	15
	16QAM StrongFEC	-83.5	-84.5	-82.0	-82.5	-81.0	-82.0	-81.5	-82.0	-82.5	-82.5	30
	32QAM StrongFEC	-80	-81.0	-79.0	-79.5	-78.5	-79.0	-78.5	-78.5	-79.0	-79.5	38
	64QAM StrongFEC	-77.5	-78.5	-76.0	-76.5	-75.5	-76.0	-75.5	-75.5	-76.0	-76.5	45
20	128QAM StrongFEC	-74.5	-75.5	-73.5	-73.5	-73.0	-72.0	-72.5	-72.5	-72.5	-74.0	53
	4QAM StrongFEC	-86.5	-87.5	-86.0	-86.0	-84.0	-85.0	-85.5	-85.0	-85.0	-86.0	30
	16QAM StrongFEC	-80.5	-81.5	-79.0	-79.5	-79.0	-78.0	-79.0	-78.5	-78.5	-79.5	61
	32QAM StrongFEC	-77.5	-78.5	-76.0	-77.0	-75.5	-76.0	-76.0	-76.0	-75.5	-76.5	76
	64QAM StrongFEC	-74.5	-75.5	-73.0	-74.0	-72.5	-72.5	-73.0	-72.5	-72.5	-73.0	91
	128QAM StrongFEC	-71	-72.0	-70.0	-71.0	-69.5	-69.5	-69.5	-70.0	-69.5	-69.5	107
	256QAM StrongFEC	-68	-69.0	-67.5	-68.5	-66.5	-66.5	-66.5	-66.5	-67.0	-67.0	122
	512QAM StrongFEC	-65	-66.0	-64.5	-65.0	-63.5	-62.5	-64.0	-63.0	-63.5	-63.5	137
1024QAM StrongFEC	-62	-63.0	-60.5	-61.0	-61.0	-59.5	-60.0	-60.0	-59.5	-59.5	152	
25	4QAM StrongFEC	-85.5	-86.5	-84.5	-85.0	-83.5	-84.5	-85.0	-84.5	-84.0	-84.5	37
	16QAM StrongFEC	-79.5	-80.5	-78.0	-79.0	-78.0	-78.0	-78.0	-78.0	-78.0	-78.0	74
	32QAM StrongFEC	-76.5	-77.5	-75.0	-75.5	-75.0	-75.0	-75.5	-75.0	-75.0	-75.0	93
	64QAM StrongFEC	-73.5	-74.5	-72.0	-73.0	-72.0	-72.0	-72.0	-72.0	-71.5	-72.0	111
	128QAM StrongFEC	-70.5	-71.5	-69.0	-70.0	-69.5	-69.0	-69.0	-69.0	-69.0	-69.5	130
	256QAM StrongFEC	-67.5	-68.5	-66.5	-67.0	-66.5	-64.5	-66.0	-66.0	-66.0	-66.5	148
	512QAM StrongFEC	-64.5	-65.5	-63.5	-64.0	-63.0	-61.5	-63.0	-62.5	-63.0	-63.5	167
	1024QAM StrongFEC	-61.5	-62.5	-60.0	-61.0	-60.0	-58.5	-59.5	-59.5	-59.5	-59.5	186
30	4QAM StrongFEC	-84.5	-85.5	-83.5	-84.0	-82.5	-83.5	-83.0	-83.5	-83.5	-84.5	45
	16QAM StrongFEC	-78.5	-79.5	-77.0	-78.0	-77.5	-76.5	-76.5	-77.0	-77.0	-77.5	91
	32QAM StrongFEC	-75.5	-76.5	-74.0	-75.0	-74.0	-73.5	-74.0	-74.0	-74.5	-74.5	114
	64QAM StrongFEC	-72.5	-73.5	-71.0	-72.0	-71.5	-71.0	-70.5	-71.0	-70.5	-71.5	137
	128QAM StrongFEC	-69.5	-70.5	-68.5	-69.5	-68.5	-68.0	-68.0	-68.0	-68.0	-69.0	160
	256QAM StrongFEC	-66.5	-67.5	-65.5	-66.0	-66.0	-63.5	-64.5	-65.0	-64.5	-66.0	183
	512QAM StrongFEC	-63.5	-64.5	-62.5	-63.0	-61.5	-60.5	-61.5	-61.5	-61.5	-62.5	206
	1024QAM StrongFEC	-60.5	-61.5	-59.0	-59.5	-59.5	-57.5	-58.5	-58.5	-59.0	-58.5	229
40	4QAM StrongFEC	-83.5	-84.5	-83.0	-83.0	-82.0	-82.0	-82.0	-82.0	-82.0	-83.0	61
	16QAM StrongFEC	-77	-78.0	-76.0	-76.5	-76.0	-75.5	-75.5	-76.0	-75.5	-76.5	122
	32QAM StrongFEC	-74.5	-75.5	-73.0	-73.5	-73.0	-72.5	-72.5	-73.0	-72.5	-73.0	152
	64QAM StrongFEC	-71.5	-72.5	-70.0	-71.0	-70.0	-69.5	-69.5	-70.0	-69.5	-70.5	183
	128QAM StrongFEC	-68.5	-69.5	-67.0	-68.0	-67.0	-66.0	-66.5	-67.0	-66.5	-68.0	214
	256QAM StrongFEC	-65.5	-66.5	-64.0	-65.0	-64.5	-62.5	-63.5	-64.0	-63.5	-64.5	244
	512QAM StrongFEC	-62.5	-63.5	-61.5	-62.0	-60.5	-59.5	-60.5	-60.0	-60.5	-61.0	275
	1024QAM StrongFEC	-59.5	-60.5	-58.5	-58.0	-58.0	-56.0	-57.5	-57.0	-57.0	-57.5	305
50	4QAM StrongFEC	-82.5	-83.5	-81.5	-82.0	-81.5	-81.0	-81.0	-81.0	-81.0	-82.0	75
	16QAM StrongFEC	-76.5	-77.5	-75.0	-75.5	-75.0	-74.5	-74.5	-74.5	-74.5	-75.0	151
	32QAM StrongFEC	-73.5	-74.5	-72.0	-73.0	-72.0	-71.0	-71.5	-72.0	-71.5	-72.5	189
	64QAM StrongFEC	-70.5	-71.5	-69.0	-70.0	-69.0	-68.5	-68.5	-69.0	-68.5	-69.0	227
	128QAM StrongFEC	-67.5	-68.5	-66.0	-67.0	-66.0	-65.0	-65.5	-66.0	-65.5	-67.0	265
	256QAM StrongFEC	-64.5	-65.5	-63.0	-64.0	-63.5	-61.5	-62.5	-63.0	-62.5	-63.5	303
	512QAM StrongFEC	-61.5	-62.5	-60.5	-61.0	-60.0	-58.5	-60.0	-59.5	-59.5	-60.5	341
	1024QAM StrongFEC	-58.5	-59.5	-57.0	-57.0	-56.5	-55.0	-56.5	-56.0	-56.5	-57.5	379
60	4QAM StrongFEC	-81.5	-82.5	-81.0	-81.0	-80.5	-79.5	-81.0	-80.0	-80.5	-81.0	90
	16QAM StrongFEC	-75.5	-76.5	-74.0	-74.0	-74.0	-73.0	-74.5	-73.5	-73.5	-74.5	180
	32QAM StrongFEC	-72.5	-73.5	-71.0	-71.5	-71.0	-70.0	-71.5	-70.0	-70.5	-72.0	226
	64QAM StrongFEC	-69.5	-70.5	-68.5	-68.5	-68.0	-67.5	-67.5	-67.5	-68.0	-69.0	271
	128QAM StrongFEC	-66.5	-67.5	-65.5	-65.5	-65.0	-64.0	-64.5	-65.0	-65.0	-66.0	316
	256QAM StrongFEC	-64	-65.0	-62.5	-62.5	-62.5	-60.5	-62.0	-61.5	-61.5	-63.0	361
	512QAM StrongFEC	-60.5	-61.5	-59.5	-59.5	-59.0	-57.5	-59.0	-58.0	-58.5	-59.5	407
	1024QAM StrongFEC	-57.5	-58.5	-56.5	-56.5	-56.0	-53.5	-55.5	-55.0	-55.5	-56.0	452

* Preliminary data

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Phoenix G2 IDU external module

CFIP-ASI-EXT



CFIP-ASI-EXT	
EAGMEXA4	External ASI module for Phoenix G2 IDU, 4x BNC, 2x SFP ports
ASI	Unbalanced, 75 ohm
Scalability	Cascading up to four external modules
Ports	
IDU connection	1x SFP port 1000Base-SX (proprietary GigE protocol)
Connection to next External module	1x SFP port 1000Base-SX (proprietary GigE protocol)
ASI ports	4x BNC
DC port	Industrial power connector
Mechanical & Electrical	
Dimensions: HxWxD	½ width 1U (45 x 210 x 240 mm) / (1.77 x 8.27 x 9.45 in)
Weight	1.3 kg / 2.87 lb
Max. power consumption	IDU: <9 W
DC port	-20V to -60V DC

Phoenix G2 IDU external module

CFIP-16E1/T1-EXT



CFIP-16E1/T1-EXT	
EAGMEX16	16E1/T1 external module for Phoenix G2 IDU, 16xRJ-45, 2xSFP ports
16xE1/T1	G.703-E1 balanced 120ohm for E1 mode G.703-E1 unbalanced 75 ohm for E1 mode T1.102-T1/100 ohm for T1 mode
Scalability	Cascading up to four external modules
Ports	
IDU connection	1x SFP port 1000Base-SX (proprietary GigE protocol)
Connection to next External module	1x SFP port 1000Base-SX (proprietary GigE protocol)
E1 ports	16x RJ-45
DC port	Industrial power connector
Mechanical & Electrical	
Dimensions: HxWxD	½ width 1U (45 x 210 x 240 mm) / (1.77 x 8.27 x 9.45 in)
Weight	1.3 kg / 2.87 lb
Max. power consumption	IDU: <9 W
DC port	-20V to -60V DC

PhoeniX G2 ODU and IRFU

Maximum Tx Power [dBm] for PhoeniX G2*:

Modulation	2 GHz (VHP)**	4/U4 GHz (HP)	L6/U6 GHz (HP/VHP)	7 GHz (HP/VHP)	8 GHz (HP/VHP)	11 GHz (HP/VHP)	13 GHz (HP/VHP)	18 GHz (SP/VHP)	23 GHz (SP)	38 GHz (SP)
Minimum Tx power		+14	+8/+13	+8/+12	+8/+11	+6/+9	+6/+8	0/+6	0	-3
4 QAM	+35	+33	+27/+33	+27/+32	+27/+31	+25/+29	+25/+28	+19/+26	+19	+17
16 QAM	+34	+32	+26/+32	+26/+31	+26/+30	+24/+28	+24/+27	+18/+25	+18	+16
32 QAM	+33	+31	+25/+31	+25/+30	+25/+29	+23/+27	+23/+26	+17/+24	+17	+15
64 QAM	+32	+30	+24/+30	+24/+29	+24/+28	+22/+26	+22/+25	+16/+23	+16	+14
128 QAM	+32	+30	+24/+30	+24/+29	+24/+28	+22/+26	+22/+25	+16/+23	+16	+14
256 QAM	+31	+29	+23/+29	+23/+28	+23/+27	+21/+25	+21/+24	+15/+22	+15	+13
512 QAM	+30	+28	+22/+28	+22/+27	+22/+26	+20/+24	+20/+23	+14/+21	+14	+12
1024 QAM	+27	+25	+19/+25	+19/+24	+19/+23	+17/+21	+17/+20	+11/+18	+11	+9

General Parameters:



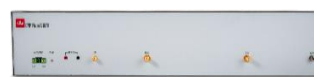
SP/HP ODU



VHP ODU



IRFU (A)



IRFU (B)

Ports	SP ODU	HP ODU	VHP ODU	IRFU
Antenna	N-Type or flange			A) N-Type or flange B) SMA Tx and Rx ports
IF to IDU	N-Type			SMA
RSSI	BNC			2-port for multi-meter
Power	over IF port			2-pin power port (alternative to IF port)
Mechanical & Electrical				
Operational use	Conforms to ETSI EN 300 019 Class 4.1, IP65, NEMA 4X			Conforms to ETSI EN 300 019 Class 3.1E, IP20, NEMA 1
Temperature Range	-33°C to +55°C			-5°C to +55°C
Dimensions: HxWxD / weight	288x288x80 mm / 3.5 kg		280x437x110 mm / 7.5 kg	19" 2U rack 90x430x260 / 5.8 kg
IF port surge protection	Conforms to ETSI EN 301 489-1; EN 61000-4-5; IEC 61000-4-5			
Frequency stability	+/- 10 ppm			
Input DC voltage	-40.5V to -57V DC (conforms to ETSI EN 300 132-2)			
Max. power consumption	13-27 W	21-39 W	39-55 W	SP: 13-27 W; HP: 21-39 W; VHP: 39-55W

G2 ODU and IRFU waveguide flange sizes

	2 GHz	4, U4 GHz	L6, U6 GHz	7, 8 GHz	10, 11 GHz	13, 15 GHz	18, 23 GHz	26 GHz	38 GHz
ODU RF interface	-	N-type	N-type (SAF2 for VHP version)	SAF2					
IRFU (w/o diplexer)	2xSMA Rx / Tx	-	2xSMA Rx / Tx					-	-
IRFU (with diplexer)	N-type	-	N-type	UBR84	UBR100	UBR140	UBR220	-	-

Frequency bands

Band	Frequency range	Duplex offset
2 GHz	1.9 – 2.4 GHz	45 MHz, 175 MHz, 189 MHz
4 GHz	3.6 – 4.2 GHz	213 MHz, 320 MHz
U4 GHz	4.4 – 5.0 GHz	100 MHz, 300 MHz, 312 MHz
L6 GHz	5.925 – 6.425 GHz	252.04 MHz, 266 MHz
U6 GHz	6.425 – 7.125 GHz	160 MHz, 170 MHz, 200 MHz, 340 MHz
7 GHz	7.110 – 7.900 GHz	154 MHz, 161 MHz, 168 MHz, 196 MHz, 245 MHz
8 GHz	7.725 – 8.5 GHz	119 MHz, 126 MHz, 151.614 MHz, 154 MHz, 160 MHz, 208 MHz, 266 MHz, 300 MHz, 310 MHz, 311.32 MHz, 525 MHz, 550 MHz
11 GHz	10.7 – 11.7 GHz	490 MHz, 500 MHz, 530 MHz
13 GHz	12.75 – 13.25 GHz	225 MHz, 266 MHz
18 GHz	17.7 – 19.7 GHz	1008 MHz, 1010 MHz, 1560 MHz
23 GHz	21.2 – 23.6 GHz	1008 MHz, 1036 MHz, 1200 MHz, 1232 MHz