

- received signal power for 1×10^{-3} , 1×10^{-6} , 1×10^{-10} BER (post-error-correction for digital systems);
- nominal receiver input level.

The received signal levels and interference levels could be referenced to the low noise amplifier (LNA)/mixer input of the receiver, so that they would be independent of receive antenna gain and feeder/multiplexer losses (assuming this to be the same for both transmitter/receiver).

The required signal levels for given BERs could be combined with the calculated receiver thermal noise level to obtain the required carrier-to-thermal noise ratio, C/N , for a given BER.

4 Tables of system parameters

Tables 1 to 38 show selected examples of digital FS systems parameters that are in use in some of the bands in which the FS systems are operating. Similar information on analogue systems can be found in Tables 39 to 46. The various radio system types are identified in the Tables by modulation type and system capacity.

The nominal long-term interference criteria specified in the Tables provide some guidance to the results that would be obtained from detailed calculations and can be used for information for the time being. For detailed sharing studies accurate criteria must be derived in accordance with the principles in Recommendation ITU-R F.758, and these may differ slightly, in some cases, from those in the Table.

It is most important that the following Notes be taken into account when considering the example Tables.

NOTE 1 – Typically, the carrier level corresponding to 1×10^{-6} BER is around 4 dB higher than that for 1×10^{-3} BER; the carrier level difference between the 1×10^{-6} and 1×10^{-10} BER points is also about 4 dB. For radio equipment using forward error correction (FEC), the carrier level corresponding to 1×10^{-6} BER is 1 to 2 dB higher than that for 1×10^{-3} BER; the carrier difference between 1×10^{-6} and 1×10^{-10} is also 1 to 2 dB.

NOTE 2 – In the example Tables a straightforward, but conservative, approach to specifying maximum permitted long-term external interference is used. This was done because the characteristics and spatial distribution of the interference sources are undefined, and it is also impractical to attempt detailed performance and availability predictions for such a large number of systems.

By referencing interference to the receiver thermal noise level the problem is greatly simplified, since the permitted interference PSD so derived will be dependent solely on receiver noise figure and independent of the modulation scheme of the victim system. It may be shown that, independent of the normal received carrier level, the degradation in fade margin with interference set to a given level relative to receiver thermal noise level is as follows:

Interference level relative to receiver thermal noise (dB)	Resultant degradation in fade margin (dB)
–6	1
–10	0.5

Within the Tables, the choice of an interference to thermal noise I/N value of –6 dB or –10 dB is selected to match the typical requirements of individual systems. For detailed sharing analyses, the interference criteria must be derived in accordance with the principles in Recommendation ITU-R F.758, to match the individual, specific, sharing scenario under consideration, and will need to be agreed between the parties concerned.

Another approach stated in Note⁽³⁾ in some of the later Tables can be applied, conforming to the method given in Recommendation ITU-R F.1565 – Performance degradation due to interference from other services

sharing the same frequency bands on a co-primary basis with real digital fixed wireless systems used in the international and national portions of a 27 500 km hypothetical reference path at or above the primary rate.

NOTE 3 – Short-term interference criteria have not been included in the example Tables. This information must be derived in accordance with the principles derived in Annex 1 to Recommendation ITU-R F.758. The Tables may be updated when this information becomes available, as a result of future detailed studies of sharing with specific services.

NOTE 4 – In Tables 1 to 46, the antenna gain is expressed only in terms of maximum gain. However, in certain frequency sharing scenarios, the minimum gain or other parameters (such as side-lobe and back-lobe gain) of the antenna may be more relevant. Annex 2 to this Report gives information about typical minimum antenna gains.

ITU-R F.2108-02 2007

TABLE 1

Digital P-P FS system parameters in the frequency bands below 1 GHz

Frequency band (MHz)	340-470			406.1-450						610-960
Modulation	GMSK	GMSK	GMSK	DQPSK	DQPSK	16-QAM	16-QAM	32-QAM	32-QAM	2-FSK and others
Capacity (Mbit/s)	5 × 32 kbit/s	5 × 32 kbit/s	5 × 32 kbit/s	0.32	4	2	8	0.768	8	1.024; 30 channels (it can use lower data rates).
Channel spacing (MHz)	0.6	0.6	0.6	0.25	3.5	1.75	3.5	0.20	1.75	0.75
	Base station	Base station	Out station							
Antenna gain (maximum) (dBi)	7	12	6	25	25	25	25	25	25	16
Feeder/multiplexer loss (minimum) (dB)	4.4	4.4	2.2	2	2	2	2	2	2	1
Antenna type	Omni	Sectoral	Panel	Yagi	Yagi	Yagi	Yagi	Yagi	Yagi	Square reflector
Maximum Tx output power (dBW)	6	6	6	7	7	10	10	0	0	7 dBW (typical: 0 dBW)
e.i.r.p. (maximum) (dBW)	8.6	13.6	9.8	30	30	33	33	23	23	22 dBW (typical: 15 dBW)
Receiver IF bandwidth (MHz)	0.6	0.6	0.6	0.3	3.14	3.5	3.5	0.15	1.67	0.75
Receiver noise figure (dB)	4	4	4	5	5	3	3	3.5	3.5	7
Receiver thermal noise (dBW)	−146.5	−146.5	−146.5	−144	−134	−143	−137	−148.7	−138.3	−138
Nominal Rx input level (dBW)	−100	−100	−100							−100
Rx input level for 1×10^{-3} BER (dBW)	−117	−117	−117	−131	−121	−122	−116	−127	−117	−124
Nominal long-term interference (dBW)	−152.5	−152.5	−152.5	−154	−144	−153	−147	−157	−147	
Equivalent power (dB(W/4 kHz))	−174.3	−174.3	−174.3	−173	−173	−175	−175	−173	−173	
Spectral density (dB(W/MHz))	−150.3	−150.3	−150.3	−149	−149	−151	−151	−149	−149	
Refer to Notes										

DQPSK: Differentially coherent quaternary phase shift keying

GMSK: Gaussian minimum shift keying

TABLE 2
Digital P-P FS system parameters in the FS frequency bands below 1 GHz

Frequency band (GHz)	0.81-0.96					
Modulation	7-FSK	4-QAM	16-QAM	7-FSK	4-QAM	16-QAM
Capacity (Mbit/s)	64 kbit/s	64 kbit/s	128 kbit/s	256 kbit/s	256 kbit/s	512 kbit/s
Channel spacing (kHz)	50	50	50	200	200	200
Antenna gain (maximum) (dBi)	24	24	24	24	24	24
Feeder/multiplexer loss (minimum) (dB)	3	3	3	3	3	3
Antenna type	Grid	Grid	Grid	Grid	Grid	Grid
Maximum Tx output power (dBW)	7	7	7	7	7	7
e.i.r.p. (maximum) (dBW)	31	31	31	31	31	31
Receiver IF bandwidth (kHz)	50	50	50	200	200	200
Receiver noise figure (dB)	5	5	5	5	5	5
Receiver thermal noise (dBW)	−152	−152	−152	−146	−146	−146
Nominal Rx input level (dBW)	−90	−90	−90	−90	−90	−90
Rx input level for 1×10^{-3} BER (dBW)	−123	−135	−130	−117	−129	−124
Nominal long-term interference (dBW)	−153	−165	−160	−147	−159	−154
Equivalent power (dB(W/4 kHz))	−164	−176	−171	−164	−176	−171
Spectral density (dB(W/MHz))	−140	−152	−147	−140	−152	−147
Refer to Notes						

TABLE 3

Digital P-P FS system parameters in the FS frequency bands below 1 GHz

Frequency band (GHz)	0.81-0.96		
Modulation	PSK	4 PSK	FSK
Capacity	1 channel	2	Data
Channel spacing	25 kHz	2	12.5 kHz
Antenna gain (maximum) (dBi)	10	8-26	10
Feeder/multiplexer loss (minimum) (dB)	0	5	0
Antenna type	Yagi	Yagi/ Dish	Yagi
Maximum Tx output power (dBW)	7	0	7
e.i.r.p. (maximum) (dBW)	17	21	17
Receiver IF bandwidth (kHz)	25	1.5	12.5
Receiver noise figure (dB)	5	7	5
Receiver thermal noise (dBW)	−155	−135	−158
Nominal Rx input level (dBW)	−	−79	−
Rx input level for 1×10^{-3} BER (dBW)	−	−119	−
Nominal long-term interference (dBW)	−	−	−
Equivalent power (dB(W/4 kHz))	−	−	−
Spectral density (dB(W/MHz))	−	−	−
Refer to Notes	−	−	−

TABLE 4
Digital P-P FS system parameters in the FS frequency bands between 1 and 3 GHz

Frequency band (GHz)	1.4	1.45-1.53										
Modulation	4 PSK	PSK 4-PSK	4-PSK	4-PSK	16-QAM	4-PSK	PCM	MSK	4-PSK	4-PSK	4-PSK	4-PSK
Capacity	2	704 kbit/s 2 Mbit/s	9.6 kbit/s	64 kbit/s	64 kbit/s	144 kbit/s	–	2 Mbit/s	2 × 2 Mbit/s	2 × 2 Mbit/s	4 × 2 Mbit/s	2 × 2 Mbit/s
Channel spacing (MHz)	2	1	0.025	0.075	0.0375	0.225	0.5	2	2	3.5	7	4
Antenna gain (maximum) (dBi)	8-26	33	33	33	33	33	33	16	16	28	28	16
Feeder/multiplexer loss (minimum) (dB)	5	1	1	1	1	1	1	5	3	T:3/R:6	T:3/R:6	5
Antenna type	Yagi/ Dish	Dish	Yagi/ dish	Yagi/ dish	Yagi/ dish	Yagi/ dish	Yagi/ dish		Yagi	Dish	Dish	Yagi
Maximum Tx output power (dBW)	0	7	7	7	7	7	10	7	7	6	6	7
e.i.r.p. (maximum) (dBW)	21	39	39	39	39	39	42	20	20	31	31	20
Receiver IF bandwidth (MHz)	1.5	0.7	0.005	0.032	0.016	0.072	0.35	1.2	1.2	3.5	7	3
Receiver noise figure (dB)	7	4.5	4	4	4	4	8	4	4	4	4	4
Receiver thermal noise (dBW)	–135	–141	–163	–155	–158	–151	–141	–139	–139	–135	–132	–135
Nominal Rx input level (dBW)	–79	–90	–118	–112	–103.5	–106	–90	–86	–84	–136	–133	–83
Rx input level for 1×10^{-3} BER (dBW)	–119	–120	–143	–137	–128.5	–131	–	–126	–124	–124.3	–121.3	–123
Nominal long-term interference (dBW)		–151	–173	–167	–168	–161	–151	–145	–145	–146	–143	–141
Equivalent power (dB(W/4 kHz))		–	–	–	–	–	–			–173.6	–179.4	
Spectral density (dB(W/MHz))		–149	–150	–152	–150	–150	–146	–146	–146	–149.7	–155.4	–146
Refer to Notes		(2), (4)	(2), (4)	(2), (4)	(2), (4)	(2), (4)	(2), (4)		(1), (4)			(1), (4)

- (1) Specified interference will reduce system C/N by 1 dB (interference 6 dB below receiver thermal noise floor).
 (2) Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).
 (3) Specified interference will have a relative contribution of no more than 10% of total noise (Recommendation ITU-R F.1094).
 (4) The specified interference level is total power within the receiver bandwidth.

TABLE 5

Digital P-P FS system parameters in the FS frequency bands between 1 and 3 GHz

Frequency band (GHz)	1.7-1.9		1.7-2.45 (refer also to Table 6)									
Modulation	4-PSK	4-PSK	4-PSK tropos.	4-PSK	4-PSK	4-PSK	4-PSK	4-PSK	9-QPR	O-QPSK	4-PSK	4-PSK
Capacity	2 × 2 Mbit/s	4 × 2 Mbit/s	2 Mbit/s	34 Mbit/s	8 Mbit/s	48 channels	12.6 Mbit/s	2 × 8 Mbit/s	4 × 1.54 Mbit/s	45 Mbit/s	8 Mbit/s	2 × 8 Mbit/s
Channel spacing (MHz)	14	14	Special	29	14	2.5	28	14	3.5	29	7	14
Antenna gain (maximum) (dBi)	28	28	45	31	30	29	30	28	32	33	28	28
Feeder/multiplexer loss (minimum) (dB)	T:3/R:6	T:3/R:6	2	1	3	6	3.5	4	3	3	5	5
Antenna type	2.4 m dish	2.4 m dish	9 m dish	1.8 m dish	1.2 m dish	Dish	Dish	2.4 m dish	3 m dish	3 m dish	1.8 m dish	1.8 m dish
Maximum Tx output power (dBW)	0	0	30	3	0	−9	−10	3	6	7	7	−3
e.i.r.p. (maximum) (dBW)	25	25	73	34	30	14	16.5	29	38	40	20	23
Receiver IF bandwidth (MHz)	3.5	7	1	20	4	1.5	6.5	8	3.5	29	3	4.6
Receiver noise figure (dB)	4	4	4	4	5	6	9	4	5	4	4	4
Receiver thermal noise (dBW)	−136	−133	−140	−127	−133	−	−	−131	−133	−125	−135	−133
Nominal Rx input level (dBW)			−	−73	−78	−78	−88.3		−70	−75	−83	−83
Rx input level for 1 × 10 ^{−3} BER (dBW)	−124.3	−121.3	−131	−113	−118	−	−		−117	−112	−123	−123
Nominal long-term interference (dBW)	−146	−143	−146	−137	−143			−137	−139	−135	−141	−139
Equivalent power (dB(W/4 kHz))	−173.6	−179.4	−	−	−			−170	−168	−174	−	−
Spectral density (dB(W/MHz))	−149.7	−155.4	−146	−150	−149	−		−146			−146	−146
Refer to Notes			(1), (4)	(2), (4)	(2), (4)	(3), (4)	(3), (4)	(1), (4)	(1)	(1)	(1)	(1)

⁽¹⁾ Specified interference will reduce system C/N by 1 dB (interference 6 dB below receiver thermal noise floor).

⁽²⁾ Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).

⁽³⁾ Specified interference will have a relative contribution of no more than 10% of total noise.

⁽⁴⁾ The specified interference level is total power within the receiver bandwidth.

TABLE 6

Digital P-P FS system parameters in the FS frequency bands between 1 and 3 GHz

Frequency band (GHz)	1.7-2.45		2.1-2.2			2.45-2.69		
Modulation	64-QAM	256-QAM	32 TCM	64-QAM	256-QAM	MSK	4-PSK	4-PSK
Capacity	45 Mbit/s	18.5 Mbit/s	3.1 Mbit/s	6.2 Mbit/s	18.5 Mbit/s	2 □ 2 Mbit/s	34 Mbit/s	2.3 Mbit/s
Channel spacing (MHz)	10	3.5	0.8	1.6	3.5	14		
Antenna gain (maximum) (dBi)	33	33	38	38	38	25	35.4	
Feeder/multiplexer loss (minimum) (dB)	2	2	0	0	0	4		
Antenna type	Dish	Dish	Dish	Dish	Dish	1.2 m dish	3 m dish	Yagi
Maximum Tx output power (dBW)	1	−1	+2	+5	+2	5	−2	
e.i.r.p. (maximum) (dBW)	34	32	40	43	40	26	33	
Receiver IF bandwidth (MHz)	10	3.5	0.8	1.6	3.5	3		
Receiver noise figure (dB)	4	4	3	3	3	4		
Receiver thermal noise (dBW)	−130	−134.5	−142	−139	−136	−135		
Nominal Rx input level (dBW)	−65	−65	−60	−60	−60	−		
Rx input level for 1×10^{-3} BER (dBW)	−106	−104.5	−117	−115	−105	−		
Nominal long-term interference (dBW)	−136	−140.5	−152	−149	−146	−141	−111.5	
Equivalent power (dB(W/4 kHz))	−170	−170				−170		
Spectral density (dB(W/MHz))	−146	−146	−151	−151	−151	−162		
Refer to Notes			(2), (4)	(2), (4)	(2), (4)			

(2) Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).

(3) The specified interference level is total power within the receiver bandwidth.

TABLE 7

Digital P-MP FS system parameters in the FS frequency bands below 3 GHz*

System	150, 450, 800 MHz	890 to 960 MHz	1.5, 2.4 and 2.6 GHz		1.5 and 2.4 GHz	1.5 to 2.6 GHz	2 GHz
1 Channel capacity (typical) (kbit/s)	2×32 or 4×16	64×1.2	10×64	30×64	30×64	60×64	48×64
2 Aggregate bit rate (kbit/s)	26×64	240	832	2 304	2 432	4 864	3 088
3 Modulation method	16-DPSK	Offset 4-PSK	2-FSK	4-PSK	4-PSK	Offset 4-PSK	4-PSK
4 Central station (CS) antenna	Omnidirectional: gains up to 10 dBi or Yagi	Omni or wide beam: gain 10 dBi	Omnidirectional: gain 10 dBi Yagi: gain 16-21 dBi Horn: gain 13 dBi		Omni or wide beam: gain 10 dBi	Omni or wide beam: gain 10 dBi	(45°) wide beam: gain: see Fig. 4 of Report 1057 (ex CCIR, Düsseldorf, 1990)
5 Out-station (OS) antenna	Yagi: gain 10 dBi	Loop Yagi: gain 20 dBi	Yagi: gain 16-21 dBi Horn: gain 13 dBi		Yagi: gain 17 dBi at 1.5 GHz Parabolic: gain 22 dBi at 1.5 GHz gain 27 dBi at 2.4 GHz	Conical: gain 17 dBi	Parabolic ($\phi \geq 1.2$ m)
6 Customer data rates (kbit/s)	Up to 1.2	1.2-64	64	1.2-19.2 64 144 (ISDN)	a) Up to 9.6 b) Standard: 64	2.4-64	64-1 544
7 Customer assignment	Fixed or demand assignment	Fixed assignment	Fixed or demand assignment		Fixed or demand assignment	Fixed or demand assignment	Fixed assignment
8 Operational range (km)	Up to 60	Up to 30	Up to 70		Up to 50	Up to 72	Up to 50
9 Equivalent power (dB(W/4 kHz))							
10 Spectral density (dB(W/MHz))							

* These parameters are from Recommendation ITU-R F.755 for TDMA systems below 3 GHz.

TABLE 8
Digital P-MP FS system parameters in the FS frequency bands below 3 GHz

Frequency band (GHz)	0.81-0.96			1.45-1.53				1.7-2.45		1.427-1.452/1.492-1.517				
Modulation	PSK	QAM	FSK	4-PSK		4-PSK		4-PSK		O-QPSK				
Capacity	24 channels	48 channels	Data			2 Mbit/s				60 × 64 kbit/s				
Channel spacing (MHz)	600 kHz	12.5 kHz	25-200 kHz	3.5		2		3.5		3.5				
	Base station	Base station	Base station	Central station	Out station	Central station	Out station	Central station	Out station	Central station/repeater			Out station	
Antenna gain (maximum) (dBi)	0	0	0	17	27	13	17.5	17	27	13	16	31	23.5	17
Feeder/multiplexer loss (dB)	0	0	0	0	0	4	4	0	0	4.4			2.5	
Antenna type	Omni	Omni	Omni	Omni/section	Dish/horn	Omni/sectoral	Yagi/horn	Omni/section	Dish/horn	Omni	Sectoral 180°	Dish (3 m)	Dish (1.2 m)	Panel
Maximum Tx output power (dBW)	30	30	20	7	7	0	0	7	7	5			5	
e.i.r.p. (maximum) (dBW)	30	30	20	24	34	6	16	24	34	13.6	16.6	31.6	26	19.5
Receiver IF bandwidth (MHz)	600	12.5	25-200	3.5	3.5	1.3	1.3	3.5	3.5	3.5			3.5	
Receiver noise figure (dB)	5	5	5	3.5	3.5	4	4	3.5	3.5					
Receiver thermal noise (dBW)	−158	−141	−155 to −146	−135	−135	−139	−139	−135	−135	−134			−134	
Nominal Rx input level (dBW)								−	−					
Rx input level for 1×10^{-3} BER (dBW)	−	−	−			−124	−124	−	−	−121			−121	
Nominal long-term interference (dBW)	−	−	−	−145	−145	−145	−145	−141	−141	−140			−140	
Equivalent power (dB(W/4 kHz))	−	−	−	−174	−174	−170	−170	−170	−170	−169.4			−169.4	
Spectral density (dB(W/MHz))	−	−	−					−	−	−145.4			−145.4	
Refer to Notes	−	−	−					(1)	(1)					

(1) Specified interference will reduce system C/N by 1 dB (interference 6 dB below receiver thermal noise floor).

TABLE 9

Digital P-P FS system parameters in the FS frequency bands between 3 and 10 GHz

Frequency band (GHz)	3.4-5.0		3.7-4.2			4.5-5.0			5.850-7.075		7.075-8.500		
Modulation	64-QAM	512-QAM	64-QAM			64-QAM			64-QAM		16-QAM	QPR	64-QAM
Capacity (Mbit/s)	90	311	45	90	135	45	90	135	45	135	45	90	135
Channel spacing (MHz)	20	40	10	20	30	10	20	30	10	30	20	40	30
Antenna gain (maximum) (dBi)	40	40	42	42	42	44	44	44	43	43	44	44	44
Feeder/multiplexer loss (minimum) (dB)	3	3	0	0	0	0	0	0	3	3	3	3	3
Antenna type	Horn/dish	Horn/dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish
Maximum Tx output power (dBW)	−1	+7 ⁽²⁾	−1	−1	−1	+2	+2	+2	−1	+4	+3	+10	+3
e.i.r.p. (maximum) (dBW)	36	44 ⁽²⁾	41	41	41	46	46	46	39	44	44	51	44
Receiver thermal noise (dBW)	−128	−126	−131	−128	−126	−131	−128	−126	−130	−125	−124	−120	−125
Rx input level for 1×10^{-3} BER (dBW)	−104	−93	−108	−105	−102	−108	−105	−102	−103	−102	−105	−101	−100
Nominal long-term interference (I/N = −13 dB ⁽¹⁾) (dBW)	−141	−139	−141	−138	−136	−141	−138	−136	−143	−138	−137	−133	−138
Spectral density (dB(W/MHz))	−154	−155	−151	−151	−151	−151	−151	−151	−153	−153	−150	−149	−153

QPR: Quadrature partial response.

⁽¹⁾ Objective for FS systems employing space diversity.⁽²⁾ −7 dBW transmit power and +30 dBW e.i.r.p. without APC.

TABLE 10
Digital P-P FS system parameters for FS frequency sharing between 3 and 10 GHz

Frequency band (GHz)	3.7-4.2	3.7-4.2	4.4-5.0	4.4-5.0	5.9-6.4			5.925-6.425	5.925-6.425	6.425-7.11	
Modulation	RBQPSK	QPSK	16-QAM	64-QAM	64-QAM			RBQPSK	64-QAM	QPSK	16-QAM
Capacity	140 Mbit/s	34 Mbit/s	140 Mbit/s	155 Mbit/s	45 Mbit/s	90 Mbit/s	135 Mbit/s	140 Mbit/s	140 Mbit/s	34 Mbit/s	140 Mbit/s
Channel spacing (MHz)	90	29	40	40	10	20	30	90	29.65	20	40
Antenna gain (maximum) (dBi)	41	37	42.5	42.5	46	46	46	45	45	45	45
Feeder/multiplexer loss (minimum) (dB)	3	3	2	3.5	0	0	0	4	5.5	5	5
Antenna type	3.7 m dish	2.4 m dish	Dish	Dish	Dish	Dish	Dish	3.7 m dish	3.7 m dish	3.7 m dish	3.7 m dish
Maximum Tx output power (dBW)	6	0	3	3	+3	+3	+3	6	2	0	0
e.i.r.p. (maximum) (dBW)	44	38	43.5	42	49	49	49	47	41.5	40	40
Receiver IF bandwidth (MHz)	56	26			10	20	30	56	29	26	44
Receiver noise figure (dB)	6	4			3	3	3	6	4	4	4
Receiver thermal noise (dBW)	−122	−128	−125.3	−127.5	−131	−128	−126	−122	−127	−128	−126
Nominal Rx input level (dBW)	−65	−68			−60	−60	−60	−65	−63	−68	−65
Rx input level for 1×10^{-3} BER (dBW)	−105	−114.5	−106	−106	−109	−106	−104	−105	−103	−114.5	−105
Nominal long-term interference (dBW)	−132	−138	−138.3	−140.5	−141	−138	−136	−132	−137	−138	−136
Equivalent power (dB(W/4 kHz))	–	–						–	–	–	–
Spectral density (dB(W/MHz))	−149	−152	−154	−155.3	−151	−151	−151	−149	−152	−152	−152
Refer to Notes	(2), (5)	(2), (4)			(2), (4)	(2), (4)	(2), (4)	(2), (5)	(2), (4)	(2), (4)	(2), (4)

⁽²⁾ Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).

⁽⁴⁾ The specified interference level is total power within the receiver bandwidth.

The specified interference level should be divided by the receiver bandwidth to obtain an average spectral density. The interference spectral density, averaged over any 4 kHz within the receiver bandwidth, must not exceed this value.

TABLE 11

Digital P-P FS system parameters in the FS frequency bands between 3 and 10 GHz

Frequency band (GHz)	3.400-3.456	3.6-4.2	4.4-5.0	5.925-6.425	6.4-7.1		6.570-6.870		6.5-6.9			7.425-7.750		7.1-8.5		
Modulation	4-PSK	16-QAM	16-QAM	16-QAM	64-QAM		4-PSK	16-QAM	128-TCM			4-PSK	16-QAM	64-QAM		
Capacity	550 kbit/s	52 Mbit/s	52 Mbit/s	52 Mbit/s	90 Mbit/s	135 Mbit/s	10 Mbit/s	52 Mbit/s	3.1 Mbit/s	12.4 Mbit/s	24.7 Mbit/s	19 Mbit/s	52 Mbit/s	45 Mbit/s	90 Mbit/s	135 Mbit/s
Channel spacing (MHz)	0.5	20	20	20	20	40	20	20	0.8	2.5	5	20	20	10	20	30
Antenna gain (maximum) (dBi)	40	40.7	42.5	45.0	47	47	45	45	47	47	47	46	46	49	49	49
Feeder/multiplexer loss (minimum) (dB)	T:4.0 R:4.0	T:7.0 R:4.0	T:7.0 R:4.0	T:7.0 R:4.0	0	0	T:2.5 R:5.5	T:3.0 R:5.0	0	0	0	T:2.5 R:5.5	T:3.0 R:5.5	0	0	0
Antenna type	Dish	Horn	Horn	Horn	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish
Maximum Tx output power (dBW)	19	-5.2	-7.1	-9.8	+3	+3	3	3	+1	+1	+1	3	3	+3	+3	+3
e.i.r.p. (maximum) (dBW)	55	28.5	28.4	28.2	50	50	45.5	45	48	48	48	46.5	46	52	52	52
Receiver IF bandwidth (MHz)	0.35	16.65	16.65	16.65	20	30	12.5	17.5	0.8	2.5	5	12.5	17.5	10	20	30
Receiver noise figure (dB)	5	4.2	4.2	4.2	3	3	5	5	3	3	3	5	5	3	3	3
Receiver thermal noise (dBW)	-143.6	-128.1	-128.1	-128.1	-128	-125	-128.0	-126.6	-142	-137	-134	-128.0	-126.6	-131	-128	-126
Nominal Rx input level (dBW)	-87	-73	-73	-73	-60	-60	-92.5	-87.5	-60	-60	-60	-92.5	-87.5	-60	-60	-60

TABLE 12
Digital P-P FS system parameters in the FS frequency bands between 3 and 10 GHz

Frequency band (GHz)	6.425-7.11	6.425-7.11	7.425-7.750	7.725-8.275	8.275-8.500	8.275-8.500
Modulation	16-QAM	16-QAM	16-QAM	128-QAM	4-PSK	16-QAM
Capacity (Mbit/s)	34	2 × 34	34	155	34	34
Channel spacing (MHz)	20	20	14	29.65	28	14
Antenna gain (maximum) (dBi)	45	45	45	45	45	45
Feeder/multiplexer loss (minimum) (dB)	Tx:1.5 Rx:2	Tx:1.5 Rx:2	Tx:1.5 Rx:2	Tx:4.6 Rx:4.8	Tx:3.0 Rx:6.5	Tx:3.0 Rx:6.5
Antenna type	Dish	Dish	Dish	Dish	Dish	Dish
Maximum Tx output power (dBW)	0	0	0	3	0	0
e.i.r.p. (maximum) (dBW)	43.5	43.5	43.5	43.4	42	42
Receiver IF bandwidth (MHz)	24	24	14	28	26	14
Receiver noise figure (dB)	4	4	4	2	4	4
Receiver thermal noise (dBW)	−130	−127	−130	−128	−127	−130
Nominal Rx input level (dBW)						
Rx input level for 1×10^{-3} BER (dBW)	−111.5	−108.5				
Nominal long-term interference (dBW)	−140	−137				
Equivalent power (dB(W/4 kHz))	−173.8	−173.6				
Spectral density (dB(W/MHz))	−149.8	−149.7				
Refer to Notes						

TABLE 13

Digital P-MP FS system parameters for FS frequency sharing between 3 and 10 GHz

Frequency band (GHz)	3.4-3.6 (TDMA) ⁽¹⁾		4 (DS-CDMA)	
Modulation	$\pi/4$ -DQPSK		QPSK	
RF transmission rate (Mbit/s)	54 channels		2	
Channel spacing (MHz)	0.30	0.30		
System type	Base station	Remote station	Remote station	Base station
Antenna maximum gain (dBi)	10	15	16 (Vertical)	16 (Vertical)
Transmit power (dBW)	−1	−3	2	2
Feeder loss (dB)	1.5	0	18	8
Antenna type				
Maximum e.i.r.p. (dBW)	9	12	0	10
Receiver IF bandwidth (MHz)	0.256	0.256	21	21
Receiver thermal noise (dBW)	−145	−145	−117	−117
Receiver threshold (10^{-6} BER) (dBW)	−72.5 (10^{-3})	−72.5 (10^{-3})	−118	−118
Maximum long-term interference power (dB(W/MHz))			−140 ⁽²⁾	−140 ⁽²⁾
Availability target (% time)			99.99	99.99
Typical fade margin (dB)			30	30
Path length (km)			3	3

⁽¹⁾ Time slot length (ms) 0.5; Frame length (ms) 5.0; Time slots per frame 10.

⁽²⁾ Measured at antenna port.

TABLE 14

Digital P-P FS system parameters in the FS frequency bands between 10 and 30 GHz

Frequency band (GHz)	10.50-10.68	10.55-10.68		10.6-10.7			10.7-11.7 (refer also to Table 17)			
Modulation	4-PSK	FSK, QPSK	FSK, QPSK	128-TCM			4-PSK	FM-FDM	64-QAM	64-QAM
Capacity	34 Mbit/s	8 Mbit/s	16 Mbit/s	3.1 Mbit/s	12.4 Mbit/s	24.7 Mbit/s	140 Mbit/s	960 channels	90 Mbit/s	135 Mbit/s
Channel spacing (MHz)	14	7	14	0.8	2.5	5	67	40	20	40
Antenna gain (maximum) (dBi)	36-45	49	49	51	51	51	49	47	51	51
Feeder/multiplexer loss (minimum) (dB)	0	0	0	0	0	0	5	5	0	0
Antenna type	Dish	Dish	Dish	Dish	Dish	Dish	3.7 m dish	2.5 m dish	Dish	Dish
Maximum Tx output power (dBW)	−7	−2	−2	−3	−3	−3	10	10	+3	+3
e.i.r.p. (maximum) (dBW)	34	47	47	48	48	48	54	52	54	54
Receiver IF bandwidth (MHz)	20.4	7	14	0.8	2.5	5	68	29	20	30
Receiver noise figure (dB)	8	3	3	4	4	4	7	7	4	4
Receiver thermal noise (dBW)	−123	−135.5	−129.5	−141	−136	−133	−119	−121	−127	−125
Nominal Rx input level (dBW)	−68	−60	−60	−60	−60	−60	−62	−65	−60	−60
Rx input level for 1×10^{-3} BER (dBW)	−108	−117	−114	−110	−104	−101	−104	N/A	−106	−103
Nominal long-term interference (dBW)		−142.5	−139.5	−151	−146	−143	−129	−131	−137	−135
Equivalent power (dB(W/4 kHz))							−	−170		
Spectral density (dB(W/MHz))		−151	−148	−150	−150	−150	−147	−	−150	−150
Refer to Notes				(1), (2)	(1), (2)	(1), (2)	(1), (2)	(1), (3)	(1), (2)	(1), (2)

N/A: Not applicable.

- (1) Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).
- (2) The specified interference level is total power within the receiver bandwidth.

TABLE 15

Digital P-P FS system parameters in the FS frequency bands between 10 and 30 GHz

Frequency band (GHz)	12.2-12.44		13/14				14.4-15.35 (refer also to Table 17)	
Modulation	4-PSK	16-QAM	4-PSK	4-PSK	4-PSK	4-PSK	64-QAM	8-PSK
Capacity	13.9 Mbit/s	50.4 Mbit/s	2 Mbit/s	8 Mbit/s	16 Mbit/s	34 Mbit/s	140 Mbit/s	156 Mbit/s
Channel spacing (MHz)	20	20	3.5	7	14	28	28	40
Antenna gain (maximum) (dBi)	50	50	49	49	49	49	49	52
Feeder/multiplexer loss (minimum) (dB)	1	1	0	0	0	0	2	5
Antenna type	Dish	Dish	Dish	Dish	Dish	Dish	Dish	Dish
Maximum Tx output power (dBW)	−5	−5	10	10	10	10	5	0
e.i.r.p. (maximum) (dBW)	40	40	45	45	45	45	47	47
Receiver IF bandwidth (MHz)	12.3	17.2	1	2	4	17	40	50
Receiver noise figure (dB)	7	5	10	10	10	10	4	5
Receiver thermal noise (dBW)	−		−134	−131	−128	−122	−124	
Nominal Rx input level (dBW)	−59 + M	−59 + M	−74	−71	−68	−65	−66	−44
Rx input level for 1×10^{-3} BER (dBW)			−116	−113	−111	−109	−101	
Nominal long-term interference (dBW)			−144	−141	−138	−132	−134	
Equivalent power (dB(W/4 kHz))			−	−	−	−	−	
Spectral density (dB(W/MHz))			−144	−144	−144	−144	−150	
Refer to Notes	(3)	(3)	(1), (4)	(1), (4)	(1), (4)	(1), (4)	(1), (4)	

M: Fade margin.

- (1) Specified interference will reduce system C/N by 1 dB (interference 6 dB below receiver thermal noise floor).
- (2) Specified interference will reduce system C/N by 0.5 dB (interference 10 dB below receiver thermal noise floor).
- (3) Specified interference will have a relative contribution of no more than 10% of total noise.
- The specified interference level is total power within the receiver bandwidth.