Draft analytical list of the Recommendations (F-series)

Fixed service

Section 1A Performance objectives, propagation and interference effects, terminology and general aspects

Section 1A1 General and terminology

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.592-4 | Vocabulary of terms for the fixed service (09/2007) | This Recommendation provides vocabulary of basic terms used in other ITU-R Recommendations or Reports in relation to the fixed service. These terms are arranged in several categories with their definitions. Important acronyms and abbreviations that appear frequently in many Recommendations are also listed. |
| F.1399-1 | Vocabulary of terms for wireless access (02/2001) | The Recommendation specifies definitions for terms primarily focused in the field of terrestrial wireless access systems. Wireless access applications may be provided within the definitions of the radio services FS, MS, FSS and MSS contained in the RR. The ITU has deprecated the use of the term “loop” (see References below: CCITT Blue Book, Vol. I, Fascicle I.3, 1988); for this reason, and more so because this term does not make any sense with radio technologies, the use of the terms that include loop are deprecated. These include wireless local loop, radio local loop, and wireless access local loop. It should be noted that in many cases systems may be able to support a mixture of users (i.e. fixed, mobile and nomadic) and possibly with restrictions on the type of mobility. It is not practical to define terms for each possible combination, but those above should suffice to refer to the primary characteristics of the system. |

Section 1A2 Performance and availability objectives

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.556-1 | Hypothetical reference digital path for radio-relay systems which may form part of an integrated services digital network with a capacity above the second hierarchical level (07/1986) | This Recommendation defines a hypothetical reference digital path for digital radio-relay systems, to afford guidance to the designers of equipment and systems for use in international telecommunication networks. |
| F.557-4 | Availability objective for radio-relay systems over a hypothetical reference circuit and a hypothetical reference digital path (07/1997) | None |
| F.594-4 | Error performance objectives of the hypothetical reference digital path for radio-relay systems providing connections at a bit rate below the primary rate and forming part or all of the high grade portion of an integrated services digital network (07/1997) | None |
| F.634-4 | Error performance objectives for real digital radio-relay links forming part of the high-grade portion of international digital connections at a bit rate below the primary rate within an integrated services digital network (09/1997) | None |
| F.695 | Availability objectives for real digital radio-relay links forming part of a high-grade circuit within an integrated services digital network (06/1990) | None |
| F.696‑2 | Error performance and availability objectives for hypothetical reference digital sections forming part or all of the medium‑grade portion of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems (09/1997) | None |
| F.697-2 | Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems (09/1997) | None |
| F.1400 | Performance and availability requirements and objectives for fixed wireless access to public switched telephone network (05/1999) | This Recommendation summarizes the objectives and requirements relating to performance and availability for wireless technology used for PSTN network access. Fixed wireless access (FWA) is the connection between the user network interface (UNI) and the PSTN local exchange (LE) service node interface (SNI) (see Fig. 1). References to and extracts of material from existing ITU Recommendations dealing with performance and availability parameters are made where appropriate. |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1605 | Error performance and availability estimation for synchronous digital hierarchy terrestrial fixed wireless systems (02/2003) | This Recommendation provides the error performance prediction methods for synchronous digital hierarchy (SDH) radio links (paths and sections) with capacities in synchronous transfer mode (STM) from 51 Mbit/s (STM-0) to 622 Mbit/s (STM-4). The prediction methods are based on a theoretically-derived relationship between bit error ratio (BER) and the SDH parameters based on errored blocks (EBs). The methods take into account system characteristics such as burst errors along with the parameters needed for predicting the outage time based on different BER thresholds. |
| F.1668-1 | Error performance objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections (01/2004) | This Recommendation provides updated information on error-performance objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections. It is the only Recommendation defining error-performance objectives for all real digital fixed wireless links. Performance events and objectives for connections using equipment designed prior to approval of ITU-T Recommendation G.826 in December 2002 are given in ITU‑T Recommendation G.821 and Recommendations ITU-R F.634, ITU‑R F.696 and ITU‑R F.697. Recommendations ITU‑R F.1397 and ITU‑R F.1491 are superseded by this Recommendation. Example of a connection, path, link and hop are given in Annex 1. Definitions of the error performance events, derived from ITU‑T Recommendations G.826 and G.828, are given in Annex 2. Examples of calculations of the error performance parameters are given in Annex 3. |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1703 | Availability objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections (01/2005) | This Recommendation provides updated information on availability objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths taking into account ITU‑T Recommendation G.827 (approved in 2003). It is the only Recommendation defining availability objectives for all real digital fixed wireless links. Recommendations ITU‑R F.1492 and ITU‑R F.1493 are superseded by this Recommendation. The applicability of Recommendations ITU‑R F.557, ITU‑R F.695, ITU‑R F.696 and ITU‑R F.697 is limited to systems designed prior to the approval of this Recommendation. Examples of the application of the Recommendation are given in Annex 1. Definition of the events, derived from ITU‑T Recommendation G.827, is given in Annex 2. |

Section 1A3 Bringing-into-service and maintenance

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1330-2 | Performance limits for bringing into service of the parts of international plesiochronous digital hierarchy and synchronous digital hierarchy paths and sections implemented by digital fixed wireless systems (04/2006) | This Recommendation provides BIS performance limits for international PDH and SDH paths and sections implemented using FWS. The approach is aligned to the ITU-T BIS approach, but some media-specific (FWS) aspects are incorporated. The Annex details the application of the performance limits for BIS. |
| F.1566-1 | Performance limits for maintenance of digital fixed wireless systems operating in plesiochronous and synchronous digital hierarchy – based international paths and sections (01/2007) | This Recommendation provides performance limits for international plesiochronous digital hierarchy (PDH) and synchronous digital hierarchy (SDH) paths and sections implemented using fixed wireless systems (FWSs). The approach is aligned with the maintenance approach taken by ITU-T, but some media-specific aspects for digital fixed wireless systems are incorporated. The Annex details the application of the performance limits for bringing into service (BIS). |

Section 1A4 Effects of propagation

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1093-2 | Effects of multipath propagation on the design and operation of line-of-sight digital fixed wireless systems (04/2006) | This Recommendation provides an introduction to propagation-related aspects of the design and operation of digital radio-relay systems, drawing on information from Radiocommunication Study Group 3 texts and measurements conducted by administrations. Annex 1 explains the role of multipath fading as the dominant propagation factor for digital radio-relay systems operating at frequencies below about 10 GHz. Further material discusses the roles of diversity techniques and adaptive equalization in reducing channel degradations. |

Section 1A5 Interference issues

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1094-2 | Maximum allowable error performance and availability degradations to digital fixed wireless systems (FWS) arising from interference from radio emissions and radiations from other sources (09/2007) | This Recommendation defines maximum allowable error performance and availability degradations to digital fixed wireless systems (FWS) arising from radio interference from emissions and radiations from other sources. |
| F.1095 | A procedure for determining coordination area between radio‑relay stations of the fixed service (09/1994) | NONE |
| F.1096 | Methods of calculating line-of-sight interference into radio-relay systems to account for terrain scattering (09/1994) | NONE |
| F.1097-1 | Interference mitigation options to enhance compatibility between radar systems and digital radio-relay systems (05/2000) | This Recommendation provides the interference mitigation options which should be taken into consideration in order to enhance compatibility between digital radio-relay systems (DRRS) and radar systems. The Annex describes technical details for the mitigation options as well as operational experiences of the radar interference to the fixed wireless systems in the bands 4 to 6GHz. |
| F.1190 | Protection criteria for digital radio-relay systems to ensure compatibility with radar systems in the radiodetermination service (10/1995) | NONE |
| F.1494 | Interference criteria to protect the fixed service from time varying aggregate interference from other services sharing the 10.7-12.75 GHz band on a co-primary basis (05/2000) | This Recommendation specifies the protection criteria for the fixed service from time varying aggregate interference from other radio services sharing the 10.7-12.75 GHz band on a co-primary basis. The criteria are defined for both the short-term in I/N and the long-term in FDP (fractional degradation in performance). |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1495-2 | Interference criteria to protect the fixed service from time varying aggregate interference from other radio communication services sharing the 17.7-19.3 GHz band on a co-primary basis (03/2012) | This Recommendation defines the interference criteria necessary to protect the fixed service from time varying aggregate interference from other radiocommunication services sharing the 17.7-19.3 GHz band on a co-primary basis. |
| 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 (05/2002) | This Recommendation specifies 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. These performance degradations are defined, for each direction of real fixed wireless links, for synchronous digital hierarchy (SDH) systems designed according to ITU‑T Recommendation G.828, or for other systems designed according to ITU‑T Recommendation G.826. |
| F.1606 | Interference criteria to protect fixed wireless systems from time varying aggregate interference produced by non-GSO satellites operating in other services sharing the 37-40 GHz and 40.5‑42.5 GHz bands on a co-primary basis (02/2003) | This Recommendation specifies the interference criteria to protect fixed wireless systems from time varying aggregate interference produced by non-geostationary satellites operating in other services sharing the 37-40 GHz and 40.5-42.5 GHz bands on a co-primary basis. The criteria are defined in terms of the *I*/*N* at the input of the FS receiver for both long-term and short-term interferences. The Annex 1 provides guidance material for the use of this Recommendation. |
| F.1669-1 | Interference criteria of fixed wireless systems operating in the 37-40 GHz and 40.5-42.5 GHz bands with respect to satellites in the geostationary orbit (09/2007) | This Recommendation provides the interference criteria to protect fixed wireless systems (FWS) from interference produced by GSO satellites in the 38 and 40 GHz bands. It includes two sets of criteria for, on the one hand, some links in certain broadband wireless access applications and, on the other hand, all other FWS. |

# Section 1B Radio-frequency arrangements, spectrum utilization, interconnection, maintenance and various applications

Section 1B1 Radio-frequency arrangements

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.382-8 | Radio-frequency channel arrangements for fixed wireless systems operating in the 2 and 4 GHz bands (04/2006) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the 2 GHz band (1 700-2 100 MHz or 1 900-2 300 MHz range) and the 4 GHz band (3 800-4 200 MHz range). The channel spacing recommended in the main text is 29 MHz with possible use of the interleaved 14 MHz spacing channels. Another channel arrangement with 28 MHz channel spacing in the range 3 700-4 200 MHz is provided in the Annex. Other arrangements used in some countries are also described in the Notes. |
| F.383-8 | Radio-frequency channel arrangements for high capacity fixed wireless systems operating in the lower 6 GHz (5 925 to 6 425 MHz) band (09/2007) | This Recommendation provides radio-frequency (RF) channel arrangements for high-capacity fixed wireless systems (FWSs) operating in the 5 925 to 6 425 MHz band, which may also be used for low- and medium-capacity systems. The main text of as well as Annexes 1 to 3 to this Recommendation present a number of RF arrangements with channel separation of 5, 10, 20, 28, 29.65, 40, 60, 80 and 90 MHz in this frequency band. |
| F.384-11 | Radio-frequency channel arrangements for medium- and high-capacity digital fixed wireless systems operating in the 6 425 to 7 125 MHz band (03/2012) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the upper 6 GHz band (6 425-7 125 MHz), which may be used for high-, medium- and low-capacity fixed systems. The channel separation recommended in the main text are 40, 30, 20, 10 and 5 MHz with the interleaved arrangements with possible use of the co-channel arrangements; recommended arrangements with 14, 7 and 3.5 MHz channel separations in combination with the 30 MHz arrangement are also provided in Annex 2. The use of multi‑carrier transmission based on these arrangements is also considered in the Annex 1 providing detailed description of this application. |
| F.385-10 | Radio-frequency channel arrangements for fixed wireless systems operating in the 7 110 to 7 900 MHz band (03/2012) | This Recommendation provides RF channel arrangements for fixed wireless systems (FWSs) operating in the 7 GHz band. The main text of as well as Annexes 1 to 5 to this Recommendation present a number of RF arrangements with channel separation of 3.5 , 5, 7, 14, and 28 MHz (including the possible use of 2 × 28 MHz adjacent channels) in the frequency range 7 110-7 900 MHz. |
| **No** | **Title** | **Scope** |
| F.386-8 | Radio-frequency channel arrangements for fixed wireless systems operating in the 8 GHz (7 725 to 8 500 MHz) band (09/2007) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the 8 GHz (7 725 to 8 500 MHz) band, which may be used for high, medium and low capacity systems. The preferred radio-frequency channel arrangements are based on multiples of basic slots either of 3.5 MHz or 2.5 MHz width. Examples in various segments of the 8 GHz band are presented in Annexes 1 to 5. Annex 6 presents an arrangement for high capacity digital systems used in some countries. For migration opportunity, Annex 7 presents a channel arrangement which was considered preferred for the deployment of analogue systems and that may still be used for digital systems. |
| F.387-12 | Radio-frequency channel arrangements for fixed wireless systems operating in the 10.7-11.7 GHz band (03/2012) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems (FWSs) operating in the 11 GHz band (10.7-11.7 GHz), which may be used for high, medium and low capacity fixed service applications including mobile infrastructure. The channel spacing recommended in the main text is 40 MHz with 15 and 55 MHz guardbands as well as a second arrangement also using a channel spacing of 40 MHz but with a 35 MHz guardband. Arrangements with channel spacings other than 40 MHz and used in some countries are also provided in the *recommends* referring to several Annexes. |
| F.497-7 | Radio-frequency channel arrangements for fixed wireless systems operating in the 13 GHz (12.75-13.25 GHz) frequency band (09/2007) | This Recommendation provides RF channel arrangements for fixed wireless systems (FWS) operating in the 13 GHz band. The main text of this Recommendation presents an RF arrangement with a channel separation of 28 MHz in the frequency range 12.75-13.25 GHz. Methodologies are provided for subdividing the main 28 MHz wide channels into smaller channels of 14, 7 and 3.5 MHz, as well as for extending the use to 2 × 28 MHz adjacent channels. |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.595‑10 | Radio-frequency channel arrangements for fixed wireless systems operating in the 17.7-19.7 GHzfrequency band (03/2012) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the 18 GHz band (17.7-19.7 GHz), which may be used for high, medium and low capacity fixed service applications including mobile infrastructure. The channel spacings recommended in the main text are 220, 110, 55 and 27.5 MHz for co-channel arrangements as well as interleaved arrangements for 220 and 110 MHz spacings. Other arrangements used in some countries are also provided. |
| F.635-6 | Radio-frequency channel arrangements based on a homogeneous pattern for fixed wireless systems operating in the 4 GHz band (05/2001) | This Recommendation provides specifications for radio frequency channel arrangements based on a homogeneous pattern for fixed wireless systems in the frequency range 3 400-4 200 MHz. Annex 1 includes arrangements with 30-90 MHz separations using homogeneous patterns. |
| F.636-4 | Radio-frequency channel arrangements for fixed wireless systems operating in the 14.4-15.35 GHz band (03/2012) | This Recommendation provides radio frequency (RF) channel arrangements for fixed wireless systems operating in the 15 GHz (14.4-15.35 GHz) band. The main text of this Recommendation presents RF channel arrangements with separations of 3.5, 7, 14, 28 and 56 MHz. Annexes 1 and 2 present arrangements with a separation of 2.5 , 5, 10, 20, 30, 40 and 50 MHz based on a homogeneous 2.5 MHz pattern. |
| F.637-4 | Radio-frequency channel arrangements for fixed wireless systems operating in the 21.2-23.6 GHz band (03/2012) | This Recommendation provides radio-frequency (RF) channel arrangements for fixed wireless systems (FWS) operating in the 21.2-23.6 GHz band. The main text of this Recommendation presents RF channel arrangements based on the homogeneous patterns with channel separations of 2.5 and 3.5 MHz. Annexes 1 to 4 present example arrangements of these homogeneous patterns used in some countries. |
| F.701-2 | Radio-frequency channel arrangements for analogue and digital point-to-multipoint radio systems operating in frequency bands in the range 1.350 to 2.690 GHz (1.5, 1.8, 2.0, 2.2, 2.4 and 2.6 GHz) (09/1997) | This Recommendation provides radio-frequency (RF) channel arrangements for point-to-multipoint (P-MP) fixed wireless systems operating in the frequency range between 1 350 and 2 690 MHz. An RF channel arrangement based on a homogeneous pattern with a 0.5 MHz channel separation is recommended for use in the bands 1 350-1 530 MHz, 1 700-1 900 MHz, 1 900-2 000 MHz, 2 100-2 300 MHz, 2 300-2 500 MHz and 2 500-2 690 MHz. |
| **No** | **Title** | **Scope** |
| F.746-10 | Radio-frequency arrangements for fixed service systems (03/2012) | This Recommendation provides general guidelines for developing radio-frequency arrangements for fixed wireless systems. It also presents a summary of all the current radio-frequency arrangements contained in various Recommendations and provides in various Annexes specific radio-frequency channel arrangements not covered in the scope of other specific Recommendations. |
| F.747-1 | Radio-frequency channel arrangements for fixed wireless systems operating in the 10.0-10.68 GHz band (03/2012) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the 10.0-10.68 GHz band or within its sub-bands. The channel arrangements specified in Annexes 1 to 4 are based on frequency separations of 3.5, 7, 14 or 28 MHz (derived from a 3.5 MHz homogeneous pattern), or frequency separations of 2.5 or 5 MHz (derived from a 1.25 MHz homogeneous pattern). |
| F.748-4 | Radio-frequency arrangements for systems of the fixed service operating in the 25, 26 and 28 GHz bands (02/2001) | This Recommendation provides specifications for radio-frequency channel arrangements for systems in the fixed service with channel separations ranging from 2.5 to 112 MHz in the bands 24.5-26.5 GHz, 27.5‑29.5 GHz, 24.25-25.25 GHz and 25.27-26.98 GHz. One Annex (Annex 3) includes block-based arrangements with bandwidths of 40 MHz and 60 MHz in the frequency range 24.25 to 26.98 GHz. |
| F.749-3 | Radio-frequency arrangements for systems of the fixed service operating in the 38 GHz band  (03/2012) | This Recommendation provides specifications for radio-frequency channel arrangements for systems in the fixed service with channel separations ranging from 2.5 to 112 MHz in the bands 36-37 GHz, 37.0‑39.5 GHz, 38.6-40 GHz and 39.5-40.5 GHz. One Annex (Annex 2) includes block-based arrangements with bandwidths of 50 MHz and 60 MHz in the frequency range 38.06 to 40 GHz. |
| F.1098-1 | Radio-frequency channel arrangements for fixed wireless systems in the 1 900-2 300 MHz band (10/1995) | None |
| F.1099-4 | Radio-frequency channel arrangements for high-capacity digital fixed wireless systems in the upper 4 GHz (4 400-5 000 MHz) band (09/2007) | This Recommendation provides radio-frequency channel arrangements for fixed wireless systems (FWS) operating in the upper 4 GHz band (4 400-5 000 MHz), which may be used for high- and medium-capacity fixed systems, based on a 10 MHz common pattern. Annexes 1 and 2 provide channel arrangements in line with the main body provisions, with 20, 40, 60, 80 MHz. Annex 3 provides an alternative arrangement with 28 MHz channels. Both co-channel or alternated arrangements are provided as well as information on multi‑carrier transmission based on these arrangements. |
| F.1242 | Radio-frequency channel arrangements for digital radio systems operating in the range 1 350 MHz to 1 530 MHz (05/1997) | None |
| **No** | **Title** | **Scope** |
| F.1243 | Radio-frequency channel arrangements for digital radio systems operating in the range 2 290-2 670 MHz (05/1997) | None |
| F.1488 | Frequency block arrangements for fixed wireless access systems in the range 3 400-3 800 MHz (05/2000) | This Recommendation provides frequency block arrangements for fixed wireless access (FWA) systems in the range 3 400-3 800 MHz. Annex 1 or Annex 2 of this Recommendation defines a frequency arrangement based on 25 MHz blocks or those formed from the aggregation of 0.25 MHz slots, respectively. |
| F.1496-1 | Radio-frequency channel arrangements for fixed wireless systems operating in the band 51.4-52.6 GHz (02/2002) | This Recommendation specifies radio frequency channel arrangements for fixed wireless systems with channel separations of 3.5, 7, 14, 28 and 56 MHz in the band 51.4-52.6 GHz, which has been identified for use for high density applications in the fixed service (HDFS). |
| F.1497-1 | Radio-frequency channel arrangements for fixed wireless systems operating in the band 55.78-59 GHz (02/2002) | This Recommendation specifies radio frequency channel arrangements for fixed wireless systems using TDD (time division duplex) or FDD (frequency division duplex) with channel separations of 3.5, 7, 14, 28 and 56 MHz in the band 55.78-59 GHz, which has been identified for use for high-density applications in the fixed service (HDFS). |
| F.1519 | Guidance on frequency arrangements based on frequency blocks for systems in the fixed service (02/2001) | This Recommendation provides an explanation of block-based frequency arrangements for systems in the fixed service. Guidance material for preparation and use of such arrangements are also given in the Annex including that for implementation and deployment. |
| F.1520-2 | Radio-frequency arrangements for systems in the fixed service operating in the band 31.8-33.4 GHz (02/2003) | This Recommendation specifies radio frequency channel arrangements for fixed service systems with channel separation of 3.5, 7, 14, 28 and 56 MHz (including 56 MHz block arrangements) in the band 31.8-33.4 GHz which has been identified for use for high density applications in the fixed service (HDFS) |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1567 | Radio-frequency channel arrangement for digital fixed wireless systems operating in the frequency band 406.1-450 MHz (05/2002) | This Recommendation provides radio-frequency (RF) channel arrangements for fixed wireless systems in the 406.1-450 MHz range. The Annex presents:  - RF channel arrangements with separations of 0.05, 0.1, 0.15, 0.2, 0.25 and 0.6 MHz in the band 406.1-413.05 MHz paired with the 423.05-430 MHz band;  - RF channel arrangements with separations of 0.25, 0.3, 0.5, 0.6, 0.75, 1, 1.75 and 3.5 MHz in the band 413.05-423.05 MHz paired with the 440-450 MHz band. |
| F.1568-1 | Radio-frequency block arrangements for fixed wireless access systems in the range 10.15-10.3/10.5-10.65 GHz (01/2005) | This Recommendation provides radio-frequency (RF) block arrangements for fixed wireless access (FWA) systems in the range 10.15-10.3/10.5-10.65 GHz. Annexes 1 and 2 present RF block arrangements based on 28 MHz blocks and 30 MHz blocks, respectively. Homogeneous patterns with a channel slot of 0.25 MHz are also given in Annexes 1 and 2. |
| F.2004 | Radio-frequency channel arrangements for fixed service systems operating in the 92-95 GHz range (03/2012) | This Recommendation describes channel arrangements in the portions of the frequency range 92.0-95.0 GHz allocated to the fixed service. The arrangements are based on a homogeneous pattern of 50 MHz slots and are proposed for either, frequency division duplex (FDD) or time division duplex (TDD) applications. |
| F.2005 | Radio-frequency channel and block arrangements for fixed wireless systems operating in the 42 GHz (40.5 to 43.5 GHz) band (03/2012) | This Recommendation provides radio-frequency channel arrangements for point-to-point (P-P) fixed wireless systems operating in the 42 GHz (40.5 to 43.5 GHz) band, which may be used for high, medium and low capacity systems. The preferred radio-frequency channel arrangements are based on multiples of basic channels of 7 MHz width merged to form higher channel widths up to 112 MHz. Additional option for block arrangement suitable for deployment of a variety of fixed wireless access (FWA) systems using multipoint technology as well as PP links for infrastructure and access purpose. Third option for a flexible mixed use of the above deployment methodology is also described. |
| F.2006 | Radio-frequency channel and block arrangements for fixed wireless systems operating in the 71-76 and 81-86 GHz bands (03/2012) | This Recommendation provides radio-frequency channel and block arrangements for fixed wireless systems (FWS) operating in the 71-76/81-86 GHz range, which may be used for broadband applications and other high-speed networks. The preferred arrangements are based on common homogeneous pattern with elementary slots of 125 MHz. The preferred radio-frequency block arrangements are based on 5 GHz sub‑band or block possibly subdivided to form smaller blocks. The preferred channel arrangement provides flexible identification of channel sizes from 250 MHz to 4 500 MHz and duplex frequency either of 2.5 GHz (single sub-band, 71-76 GHz or 81-86 GHz, arrangement) or 10 GHz (joint sub-bands, 71-76 GHz and 81‑86 GHz together, arrangements). |

Section 1B2 System general characteristics

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.750-4 | Architectures and functional aspects of radio-relay systems for synchronous digital hierarchy (SDH)-based network (05/2000) | This Recommendation defines the architectures and functional aspects of digital fixed wireless systems for synchronous digital hierarchy (SDH)-based networks aiming at their complete operational integration in such a network. The architectures are defined in terms of functional blocks without any constraint on physical implementation. |
| F.751-2 | Transmission characteristics and performance requirements of radio-relay systems for SDH-based networks (09/1997) | None |
| F.752-2 | Diversity techniques for point-to-point fixed wireless systems (05/2006) | This Recommendation provides diversity techniques for point-to-point fixed wireless systems. The diversity techniques include those considered in the domain of space, angle, frequency or their combinations. Basic methods for choice of diversity, obtaining or processing the diversity signals are presented in the Annex, which also gives practical diversity effects based on propagation data. Diversity techniques using alternative transmission media or route/site diversity which may be applied to improve system availability are not handled in this Recommendation. |
| F.1101 | Characteristics of digital fixed wireless systems below about 17 GHz (09/1994) | None |
| F.1102-2 | Characteristics of fixed wireless systems operating in frequency bands above about 17 GHz (01/2005) | This Recommendation provides characteristics of fixed wireless systems operating in frequency bands above about 17 GHz. The Annex 1 contains possible applications, hop length consideration, basic functions of transmitters and receivers, and other technical/operational characteristics required for the implementation of fixed wireless systems in this frequency range. |
| F.1191-2 | Bandwidths and unwanted emissions of digital fixed service systems (02/2001) | This Recommendation gives an explanation of basic terms relating to unwanted emissions and bandwidths of digital fixed service systems to clarify the application of definitions in the Radio Regulations and Recommendations ITU-R SM.328 and SM.329, as well as guidance consideration on these subjects for use for system or equipment designer of fixed service systems.  Considerations have been made on the occupied bandwidth of multicarrier systems and requirements for out-of-band emissions for systems used in the block-based assignment. |
| F.1498-1 | Deployment characteristics of fixed service systems in the band 37-40 GHz for use in sharing studies (02/2002) | This Recommendation provides deployment characteristics of fixed wireless systems for use in sharing studies, aimed at efficient spectrum utilization of the band 37‑40 GHz to be utilized for high‑density applications in the fixed service (HDFS). The Annex gives examples of high‑density deployment situations of point‑to‑point systems used for links between mobile base stations and infrastructure networks as well as subscriber based point‑to‑point and point‑to‑multipoint networks that substitute for optical fibre subscriber access connections. |
| F.1704 | Characteristics of multipoint-to-multipoint (MP-MP) fixed wireless systems with mesh network topology operating in frequency bands above about 17 GHz (01/2005) | This Recommendation provides guidance for the system configuration and characteristics of Multipoint-to-Multipoint (MP-MP) fixed wireless systems (FWSs) with mesh network topology operating in frequency bands above about 17 GHz. The Annex analyses improvement of availability and reduction of transmit power as well as route diversity effect and the required function for MP-MP systems. |

Section 1B3 Interconnection characteristics and maintenance

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1705 | Analysis and optimization of the error performance of digital fixed wireless systems for the purpose of bringing into service and maintenance (01/2005) | This Recommendation provides analysis for optimization of the error performance of digital fixed wireless systems (FWSs) for the purpose of practical maintenance work prior to bringing into service. Annex 1 presents the guidance and systematic methods for the maintenance of both point-to-point (P-P) and point-to-multipoint P-MP systems. |

Section 1B4 Characteristics of fixed wireless systems using High Altitude Platform Stations (HAPS)

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1500 | Preferred characteristics of systems in the fixed service using high altitude platforms operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz (05/2000) | This Recommendation provides the preferred characteristics of systems in the fixed service using high altitude platform stations (HAPS). Annex 1 has been developed for use for the analysis of the frequency reuse and the sharing possibilities between such systems and other systems in the bands 47.2‑47.5 GHz and 47.9-48.2 GHz. |
| F.1501 | Coordination distance for systems in the fixed service (FS) involving high-altitude platform stations (HAPSs) sharing the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz with other systems in the fixed service (05/2000) | This Recommendation provides calculation methods to determine coordination distances between the fixed service using high altitude platform stations (HAPS) and other systems in the fixed service in the bands 47.2‑47.5 GHz and 47.9-48.2 GHz. |
| F.1569 | Technical and operational characteristics for the fixed service using high altitude platform stations in the bands 27.5‑28.35 GHz and 31-31.3 GHz (05/2002) | This Recommendation provides technical and operational characteristics for the fixed service using high altitude platform stations (HAPS) in the bands 27.5-28.35 GHz and  31-31.3 GHz. The specified characteristics include the frequency reuse factor of the cell illuminated by the HAPS antenna spot beams, the shielding effect of the metal-coated airship body and other typical technical parameters for HAPS systems to be used for the sharing studies with other systems. |

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.1607 | Interference mitigation techniques for use by high altitude platform stations (HAPS) in the 27.5-28.35 GHz and 31.0‑31.3 GHz bands (02/2003) | This Recommendation provides interference mitigation techniques for systems utilizing HAPS in the band 27.5-28.35 GHz and 31.0-31.3 GHz. These techniques could mitigate various interference effects to and from other systems sharing the same bands or operating in the adjacent bands. The Annex gives the outline and the advantages of these techniques which include increasing minimum elevation angles, improvement of antenna radiation patterns, shielding effects of HAPS airship envelope, dynamic channel assignment and automatic transmit power control. |
| F.1608 | Frequency sharing between systems in the fixed service using high altitude platform stations and conventional systems in the fixed service in the bands 47.2-47.5 and 47.9-48.2 GHz (02/2003) | This Recommendation deals with frequency sharing between conventional fixed service (FS) systems and systems using high altitude platform stations (HAPS) in the bands 47.2-47.5 and 47.9‑48.2 GHz. Based on the analysis utilizing HAPS system parameters described in Recommendation ITU-R F.1500, the Annexes provide a methodology for the sharing study as well as a guidance for the sharing feasibility between HAPS and FS systems according to their deployed area coverage. |
| F.1609-1 | Interference evaluation from fixed service systems using high altitude platform stations to conventional fixed service systems in the bands 27.5-28.35 and 31.0-31.3 GHz (04/2006) | This Recommendation describes interference evaluation methodologies from the fixed service (FS) using high altitude platform stations (HAPS) to conventional FS systems in the bands 28 GHz (27.5-28.35 GHz) and 31 GHz (31-31.3 GHz). Examples of interference calculations using these methodologies are also provided in Annexes 1 to 3 for both point-to-point and point-to-multipoint fixed wireless access (FWA) stations. |
| F.1764 | Methodology to evaluate interference from fixed service systems using high altitude platform stations (HAPS) to fixed wireless systems in the bands above 3 GHz (04/2006) | This Recommendation provides a methodology for interference evaluation that could be used for sharing studies between fixed service systems using high altitude platform stations (HAPS) and conventional fixed wireless systems in the frequency bands above 3 GHz in response to the technical study invited by Resolution 734 (Rev.WRC-03). Interference situations from HAPS airships and ground stations to the radio-relay stations are analysed. |
| F.1820 | Power flux-density at international borders for high altitude platform stations providing fixed wireless access services to protect the fixed service in neighbouring countries in the 47.2‑47.5 GHz and 47.9-48.2 GHz bands (09/2007) | This Recommendation provides power flux density (pfd) values for the purpose of protecting conventional fixed service stations in neighbouring administrations from co‑channel interference from a high altitude platform station (HAPS) operating in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz. |
| F.2011 | Evaluation of interference from high-altitude platform (HAPS) gateway links (HAPS-to-ground direction) in the fixed service to conventional fixed wireless systems in the range 5 850-7 075 MHz (01/2012) | This Recommendation provides a method for the evaluation of interference between fixed service (FS) systems using high-altitude platform stations (HAPS) gateway links (HAPS-to-ground) and conventional fixed wireless systems in the range 5 850-7 075 MHz in response to the technical study invited by Resolution 734 (Rev.WRC-07). The method is used to determine areas where specific values of I/N would be exceeded in an FS receiver. Results include plots and calculations of the areas for various specified I/N values. |

Section 1B5 Trans-horizon radio-relay systems

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.302-3 | Limitation of interference from trans-horizon radio-relay systems (05/1997) | This Recommendation provides technical and operational requirements of trans-horizon radio-relay systems in the fixed service to avoid interference to line-of-sight fixed wireless systems or systems in other services operating in nearby countries. |
| F.698-2 | Preferred frequency bands for trans-horizon radio-relay systems (09/1994) | This Recommendation provides factors which should be taken into account when selecting frequency bands for trans-horizon radio-relay systems in the fixed service from the viewpoint of frequency sharing conditions with other services as well as the total noise including thermal and intermodulation noises due to propagation. |
| F.1106 | Effects of propagation on the design and operation of trans‑horizon radio-relay systems (09/1994) | None |

Section 1B6 Wireless access systems and related applications

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.755-2 | Point-to-multipoint systems in the fixed service (05/1999) | This Recommendation deals with point-multipoint systems, including concept and basic system characteristics of high density applications of the fixed service (HDFS) in 25 to 32GHz band. Also technical information on point-to-multipoint systems operating in 3.5GHz, 10.4GHz, 26/28GHz and 32GHz is contained. |
| F.757-3 | Basic system requirements and performance objectives for fixed wireless access using mobile-derived technologies offering telephony and data communication services (02/2003) | This Recommendation provides basic system requirements and performance objectives for fixed wireless access (FWA) using mobile-derived technologies. The new version updates the text to reflect latest system parameters using mobile-derived technologies as well as to incorporate a new Annex describing FWA systems offering data communication service. |
| F.1103-1 | Basic requirements and technologies for fixed wireless systems operating in bands below 3 GHz for the provision of wireless subscriber connections in rural areas (09/2007) | This Recommendation provides basic requirements and technologies for fixed wireless access (FWA) systems operating in bands below 3 GHz for use for wireless connections in rural areas. The requirements include service aspects as well as performance/availability objectives. The Annexes describe technical and operational information specifically required for FWA applications used in rural areas. |
| F.1105-2 | Fixed wireless systems for disaster mitigation and relief operations (05/2006) | This Recommendation provides characteristics of fixed wireless systems used for disaster mitigation and relief operations. Several types of such systems including transportable equipment are specified according to channel capacity, operating frequency bands, transmission distance and propagation path conditions.  Detailed descriptions of these systems are also given in Annex 1 as guidance. |
| F.1332-1 | Radio-frequency signal transport through optical fibres (05/1999) | This Recommendation deals with radio-frequency signal transport through optical fibres. The text is largely amplified incorporating concept of hybrid fibre-radio system (HFR). As information on HFR, system configuration, service application, intermediate frequency transmission technology are added. Furthermore, signal level compression technique is introduced in order to improve the dynamic range for the optical link. |
| F.1401-1 | Considerations for the identification of possible frequency bands for fixed wireless access and related sharing studies (01/2004) | This Recommendation provides a methodology for identification of suitable frequency spectrum for FWA systems and a list of items to be addressed in identifying candidate bands. These take into account on compatible operations with systems in other radio services sharing the same bands, characteristics and operational requirements, spectrum requirements, and interference mitigation technologies. |
| F.1490-1 | Generic requirements for fixed wireless access systems (09/2007) | This Recommendation summarizes generic requirements needed to ensure that radio technologies can be applied to FWA applications and intended for the use by administrations and operators considering deployment of FWA systems. |
| F.1499 | Radio transmission systems for fixed broadband wireless access based on cable modem standard (05/2000) | This Recommendation is based on the standards approved and published by ITU‑T for cable modems (specifically ITU‑T Recommendation J.112, Annex B), but adapts the technical parameters for use in the wireless access environment, that is for BWA customer premises equipment (CPE) modems. The commonality is maximized to achieve economies of scale.  This Recommendation is complementary to ITU-T Recommendation J.116. This Recommendation and ITU-T Recommendation J.116 should be considered in their totality when implementing BWA systems. |
| F.1518 | Spectrum requirement methodology for fixed wireless access and mobile wireless access networks using the same type of equipment, when coexisting in the same frequency band (05/2001) | In this methodology, the MWA system and the FWA system use the same type of equipment based on TDMA and/or FDMA technology, where the equipment chooses autonomously an unused radio channel within the frequency band. Coexistence conditions for such MWA and FWA systems when they use the same frequency band at the same area are examined.  The method described in this Annex can be applied to a wide range of frequency bands by applying a propagation formula suitable for the target frequency. |
| F.1671 | Guidelines for a process to address the deployment of area‑licensed fixed wireless systems operating in neighbouring countries (01/2004) | This Recommendation provides guidelines for a process to address deployment of area-licensed fixed wireless systems aiming at avoidance of adverse effects of interference to the fixed wireless networks in neighbouring countries. Two example options are presented in the Annex using power flux-density levels at the affected service area boundary for triggering the coordination. |
| F.1763 | Radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz (04/2006) | This Recommendation identifies specific radio interface standards for BWA systems in the fixed service operating below 66 GHz, addressing profiles for the recommended interoperability standards. It provides references to the standards for interoperability between BWA systems. The interoperability standards referenced in this Recommendation include the following specifications:  – system profiles;  physical layer parameters, i.e. channelization, modulation scheme, data rates;  medium access control (MAC) layer messages and header fields;  – conformance testing methods.  This Recommendation is not intended to deal with the identification of suitable frequency bands for BWA systems, nor any regulatory issues. |

# Section 1C HF Systems

Section 1C1 Technical and operational characteristics

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.162-3 | Use of directional transmitting antennas in the fixed service operating in bands below about 30 MHz (03/1992) | None |
| F.240-7 | Signal-to-interference protection ratios for various classes of emission in the fixed service below about 30 MHz (05/2006) | This Recommendation describes minimum signal-to-interference protection ratios and frequency separations for various classes of emission in the fixed service below about 30 MHz. |
| F.338-2 | Bandwidth required at the output of a telegraph or telephone receiver (07/1990) | None |
| F.339-7 | Bandwidths, signal-to-noise ratios and fading allowances in complete systems (02/2006) | There are a large variety of HF fixed systems in operation or being developed to meet future requirements. Consequently, it is not appropriate to assume and use a single “typical” system as a general purpose model.  This Recommendation shows selected examples of various HF fixed service systems that are currently in use and describes the key system parameters (bandwidths, signal-to-noise ratios (SNRs), and fading allowances) for these systems. The system parameters should be used in the deployment of HF fixed systems. |
| F.348-4 | Arrangement of channels in multi-channel single-sideband and independent-sideband transmitters for long-range circuits operating at frequencies below about 30 MHz (06/1990) | None |
| F.454-1 | Pilot carrier level for HF single-sideband and independent‑sideband reduced-carrier systems (01/1978) | None |
| F.612 | Measurement of reciprocal mixing in HF communication receivers in the fixed service (07/1986) | None |
| F.613 | The use of ionospheric channel sounding systems operating in the fixed service at frequencies below about 30 MHz (07/1986) | None |
| F.1110-3 | Adaptive radio systems for frequencies below about 30 MHz (02/2003) | This Recommendation provides the general functions of HF adaptive systems. |
| F.1192 | Traffic capacity of automatically controlled radio systems and networks in the HF fixed service (10/1995) | None |
| F.1337 | Frequency management of adaptive HF radio systems and networks using FMCW oblique-incidence sounding (09/1997) | None |
| F.1487 | Testing of HF modems with bandwidths of up to about 12 kHz using ionospheric channel simulators (05/2000) | This Recommendation provides methodology for testing of HF ionospheric transmission for systems up to about 12 kHz bandwidth. This Recommendation also provides comparative testing for HF modems and quantitative testing for HF modems. |
| F.1610 | Planning, design and implementation of HF fixed service radio systems (02/2003) | This Recommendation provides guidance in the planning, design and implementation of HF fixed service radio systems. This Recommendation addresses equipment, system analysis and design, site and field surveys and system testing. |
| F.1611 | Prediction methods for adaptive HF system planning and operation (02/2003) | This Recommendation provides guidance on Adaptive HF system planning and operation using prediction methods. This Recommendation addresses frequency planning, power budget and the design process including many references to other ITU-R Recommendations. |
| F.1761 | Characteristics of HF fixed radiocommunication systems (05/2006) | This Recommendation specifies the typical RF characteristics of fixed radiocommunication systems in the 2‑30 MHz range. |
| F.1762 | Characteristics of enhanced applications for high frequency (HF) radiocommunication systems (05/2006) | This Recommendation describes the technical characteristics of enhanced applications for high frequency (HF) radiocommunication systems to provide. |
| F.1778 | Channel access requirements for HF adaptive systems in the fixed service (01/2007) | This Recommendation describes channel access objectives and techniques for HF adaptive systems in the fixed service to minimize interference to and from other systems. |
| F.1821 | Characteristics of advanced digital high frequency (HF) radiocommunication systems (09/2007) | This Recommendation specifies the typical RF characteristics of advanced digital HF systems for use in sharing studies for two types of emerging advanced digital HF systems, token passing protocols and wideband modems. Wideband modems are further subdivided into two major systems, multichannel operations and Digital Radio Mondiale operations. A table of characteristics within the Annex to this Recommendation provides a summary of the values needed for sharing studies. |

Section 1C2 HF radiotelephony

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1111-1 | Improved Lincompex system for HF radiotelephone circuits (10/1995) | NONE |
| F.1112-1 | Digitized speech transmissions for systems operating below about 30 MHz (10/1995) | NONE |

Section 1C3 HF radiotelegraphy

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.106-2 | The use of diversity for voice-frequency telegraphy on HF radio circuits (05/1999) | This Recommendation deals with the use of diversity reception for telegraphy systems at frequencies below 30 MHz. The Annex addresses the use of coding diversity. |
| F.246-3 | Frequency-shift keying (07/1970) | NONE |

Section 1C4 HF data transmission

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.763-5 | Data transmission over HF circuits using phase shift keying or quadrature amplitude modulation (01/2005) | This Recommendation provides data transmission systems using phase-shift keying (PSK) and quadrature amplitude modulation (QAM) over HF channels. Information is contained in Annex 6 for data rates from 3 200 to 12 800 bit/s. |
| F.764-1 | Minimum requirements for HF radio systems using a packet transmission protocol (09/1994) | NONE |
| F.1113 | Radio systems employing meteor-burst propagation (09/1994) | NONE |

# Section 1D Frequency sharing with other services (except for the fixed-satellite service)

Section 1D1 Sharing principles and methodology for interference assessment

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.758-5 | System parameters and considerations in the development of criteria for sharing or compatibility between digital fixed wireless systems in the fixed service and systems in other services and other sources of interference (03/2012) | This Recommendation contains principles for the development of sharing criteria of digital systems in the fixed service. Considerations are mainly given on how to properly design performance and availability degradations due to interference within the allowable objectives, as specified in Recommendation ITU‑R F.1094, under the various interference environments. It also contains information on representative technical characteristics and typical system sharing parameters of digital fixed wireless systems in the fixed service for use in sharing studies above about 30 MHz. In cases where analyses indicate sharing issues, additional information on specific fixed systems deployed by administrations can be found in Report ITU-R F.2108. |
| F.1107-1 | Probabilistic analysis for calculating interference into the fixed service from satellites occupying the geostationary orbit (05/2002) | This recommendation provides methods for developing sharing criteria for interference from satellites occupying the geostationary orbit into radio-relay routes in the fixed service. Annex 1 provides general considerations, addresses interference into analogue systems and includes examples and a computer program to implement the methodology. Annex 2 extends the approach of Annex 1 to digital systems, and provides an outline of a calculation methodology. |
| F.1108-4 | Determination of the criteria to protect fixed service receivers from the emissions of space stations operating in non-geostationary orbits in shared frequency bands (01/2005) | This Recommendation contains various methodologies to determine the criteria to protect fixed service receivers from emissions of space stations operating in non-geostationary orbits in shared frequency bands, including highly elliptical orbits (HEOs). |
| F.1333-1 | Estimation of the actual elevation angle from a station in the fixed service towards a space station taking into account atmospheric refraction (05/1999) | This Recommendation provides a method of calculating the actual elevation angle as seen from a station in the fixed service towards a space station where the elevation angle towards the station is known only under free-space propagation conditions in vacuum. The method is developed using the mean annual global reference atmosphere given in Recommendation ITU‑R P.835. |
| F.1403 | Power flux-density criteria in ITU-R Recommendations for protection of systems in the fixed service in frequency bands shared with space stations of various space services (05/1999) | This Recommendation provides a categorical list of references to the ITU-R Recommendations that give the power flux-density (pfd) limits or pfd coordination thresholds that provide the basis for sharing between the fixed service and satellite services that share frequency bands on a co-primary basis. The Annex provides the historical evolution of the development of pfd criteria in ITU-R Recommendations for protection of systems in the FS. |

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1404-1 | Minimum propagation attenuation due to atmospheric gases for use in frequency sharing studies between systems in the fixed service and systems in the broadcasting-satellite, mobile‑satellite and space science services (05/2002) | This Recommendation provides the method for estimating the minimum slant-path attenuation due to atmospheric gasses, including water vapor, for use in frequency sharing studies between systems in the fixed service and systems in the broadcasting-satellite, mobile-satellite and space science services. The method is developed on a band-by-band basis to provide the minimum attenuation for the driest month and at the frequency that gives the lowest attenuation in each band. |
| F.1777 | System characteristics of television outside broadcast, electronic news gathering and electronic field production in the fixed service for use in sharing studies (01/2007) | This Recommendation, dealing with system characteristics of television outside broadcast (TVOB), electronic news gathering (ENG) and electronic field production (EFP) in the fixed service for use in sharing studies contains the typical system parameters and operational requirements for these broadcast auxiliary services (BAS)[[1]](#footnote-1), which are required for sharing studies between the analogue and digital BAS in the fixed service and other radiocommunication services. |

Section 1D2 Sharing with the broadcasting and broadcasting-satellite services

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.760-1 | Protection of terrestrial line-of-sight fixed wireless systems against interference from the broadcasting-satellite service in the bands near 20 GHz (09/1994) | NONE |
| F.1338 | Threshold levels to determine the need to coordinate between particular systems in the broadcasting-satellite service (sound) in the geostationary-satellite orbit for space-to-Earth transmissions and the fixed service in the band 1 452‑1 492 MHz (10/1997) | NONE |
| F.1670-1 | Protection of fixed wireless systems from terrestrial digital video and sound broadcasting systems in the shared VHF and UHF bands (05/2006) | This Recommendation deals with protection of fixed wireless systems from terrestrial digital video and sound broadcasting systems in shared VHF and UHF bands. |

Section 1D3 Sharing with the mobile and mobile-satellite services

|  |  |  |
| --- | --- | --- |
| **No** | **Title** | **Scope** |
| F.1246 | Reference bandwidth of receiving stations in the fixed service to be used in coordination of frequency assignments with transmitting space stations in the mobile-satellite service in the 1-3 GHz range (05/1997) | None |
| F.1334 | Protection criteria for systems in the fixed service sharing the same frequency bands in the 1 to 3 GHz range with the land mobile service (09/1997) | None |
| F.1335 | Technical and operational considerations in the phased transitional approach for bands shared between the mobile‑satellite service and the fixed service at 2 GHz (09/1997) | None |
| F.1402 | Frequency sharing criteria between a land mobile wireless access system and a fixed wireless access system using the same equipment type as the mobile wireless access system (05/1999) | This Recommendation describes the frequency sharing criteria between the FWA and MWA systems on the assumption that both systems use the same frequency and type of equipment. Necessary geographical separations between both systems are calculated for the cases that the systems employ time division duplex (TDD) or frequency division duplex (FDD). |
| F.1706 | Protection criteria for point-to-point fixed wireless systems sharing the same frequency band with nomadic wireless access stems in the 4 to 6 GHz range (01/2005) | This Recommendation provides the protection criteria for point-to-point (P-P) fixed wireless systems (FWS) from nomadic wireless access systems (NWAS) in the 4 to 6 GHz range operating in areas near international borders. Annex 1 gives the basic analysis factors and simulation examples of separation distances to protect P-P FWS from interference caused by NWAS. |

Section 1D4 Sharing with radiodetermination service

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.1489 | A methodology for assessing the level of operational compatibility between fixed wireless access and radiolocation systems when sharing the band 3.4-3.7 GHz (05/2000) | This Recommendation provides a methodology to assess the level of operational compatibility between fixed wireless access (FWA) and radio location systems when they are sharing the frequency band 3400-3700 MHz. The methodology may be applied to determine whether or not intended FWA operations are sufficiently distant from the operating areas of radiolocation systems, so as not to receive unacceptable interference, and/or to determine suitable mitigation techniques that could be implemented. |
| F.1571 | Mitigation techniques for use in reducing the potential for interference between airborne stations in the radionavigation service and stations in the fixed service in the band 31.8‑33.4 GHz (05/2000) | This Recommendation provides guidance on mitigating the potential for interference between airborne stations in the radionavigation service and stations in the fixed service in the band 31.8-33.4 GHz. Specific mitigation measures for the FS and aeronautical radionavigation service (ARS) are mentioned and the sharing studies deriving the potential for interference between these services is included in the Annexes. |

Section 1D5 Sharing with space science services

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.1247-2 | Technical and operational characteristics of systems in the fixed service to facilitate sharing with the space research, space operation and Earth exploration-satellite services operating in the bands 2 025-2 110 MHz and 2 200-2 290 MHz (06/2009) | This Recommendation provides operational characteristics of fixed service systems to facilitate sharing with systems in the space science services that operate in the bands 2 025‑2 110 MHz and 2200-2290 MHz. It provides, inter alia, the orbital locations of the GSO satellites toward which emissions should be limited. |
| F.1248 | Limiting interference to satellites in the space science services from the emissions of trans-horizon radio-relay systems in the bands 2 025-2 110 MHz and 2 200-2 290 MHz (05/1997) | None |
| F.1249-2 | Technical and operational requirements that facilitate sharing between point-to-poiny systems in the fixed service and the inter-satellite service in the band 25.25-27.5 GHz (10/2009) | This Recommendation provides maximum e.i.r.p. density of transmitting poit-to-point fixed service stations towards the direction of the geostationary-satellite orbit to enable sharing with the inter-satellite service in the band 25.25-27.5 GHz. The reference e.i.r.p. density in this Recommendation takes into account the need for transmission at the minimum necessary level while taking into account use of Automatic Transmitter Power Control (ATPC) at the FS stations for precipitation events. |
| F.1502 | Protection of the fixed service in the frequency band 8 025‑8 400 MHz sharing with geostationary-satellite systems of the Earth exploration-satellite service (space-to-Earth) (05/2000) | This Recommendation provides guidance for protection of the fixed service from geostationary-satellite systems of the Earth exploration-satellite service (space-to-Earth). It also provides specific limits on the spectral pfd produced at the surface of the Earth (Regions 1 and 3 only) by emissions from a satellite, for all conditions and methods of modulation. |
| F.1509-1 | Technical and operational requirements that facilitate sharing between point-to-multipoint systems in the fixed service and the inter-satellite service in the band 25.25-27.5 GHz (10/2009) | This Recommendation provides maximum e.i.r.p. density of transmitting hub and subscriber point‑to‑multipoint stations in the fixed service towards the direction of geostationary-satellite orbit to enable sharing with the inter-satellite service in the band 25.25-27.5 GHz. The reference e.i.r.p. density in this Recommendation takes into account the need for transmission at the minimum necessary level while taking into account use of automatic transmitter power control (ATPC) at the FS stations for precipitation events. |
| F.1570-2 | Impact of uplink transmission in the fixed service using high altitude platform stations on the Earth exploration-satellite service (passive) in the 31.3-31.8 GHz band (04/2010) | This Recommendation provides guidance on the interference evaluation method of HAPS uplink on the EESS (passive) in the 31.3-31.8 GHz band. Annex 1 provides considerations on a limit for the level of unwanted emissions of a transmitter at the input of a HAPS ground station antenna using the typical parameters for HAPS system in the 31-31.3 GHz given in Recommendation ITU-R F.1569. |
| F.1612 | Interference evaluation of the fixed service using high altitude platform stations to protect the radio astronomy service from uplink transmission in HAPS systems in the 31.3‑31.8 GHz band (02/2003) | This Recommendation deals with the evaluation of interference arising from unwanted emissions from the uplink of high altitude platform station (HAPS) systems in the fixed service in the band 31.3-31.8 GHz to protect a radio astronomy (RAS) station. The Annexes 1 to 3 provide typical parameters of the victim RAS station and interfering HAPS ground stations, propagation models for the evaluation and impact of the interference using the typical parameters. |
| F.1613 | Operational and deployment requirements for fixed wireless access systems in the fixed service in Region 3 to ensure the protection of systems in the Earth exploration-satellite service (active) and the space research service (active) in the band 5 250-5 350 MHz (02/2003) | This Recommendation provides guidance on fixed wireless access (FWA) systems in Region 3 to ensure the protection of systems in the Earth exploration-satellite (EES) service (active) and the space research (SR) service (active) in the band 5 250-5 350 MHz. Specifically this Recommendation provides a methodology to be used to assess the aggregate interference level from FWA systems as well as technical and operational limits on FWA to protect the EES and SR (active) services. |
| F.1760 | Methodology for the calculation of the aggregate equivalent isotropically radiated power (a.e.i.r.p.) distribution from point-to-multipoint high-density applications in the fixed service operating in bands above 30 GHz identified for such use (05/2006) | This Recommendation provides a methodology which may be used to derive the a.e.i.r.p. for transmitting point-to-multipoint (P-MP) and multipoint -to-multipoint (MP-MP) high-density applications in the fixed service (HDFS) stations in bands above 30 GHz which may be used by administrations wishing to assess the potential interference from P-MP HDFS stations to other services. |
| F.1765 | Methodology for determining the aggregate equivalent isotropically radiated power from point-to-point high-density applications in the fixed service operating in bands above 30 GHz (04/2006) | This Recommendation provides methodologies which may be used to derive the aggregate equivalent isotropically radiated power (a.e.i.r.p) for transmitting point-to-point (P-P) high density applications in the fixed service (HDFS) stations in bands above 30 GHz which may be used by administrations wishing to assess the potential interference from P‑P HDFS stations to other interfered‑with services. |
| F.1766 | Methodology to determine the probability of a radio astronomy observatory receiving interference based on calculated exclusion zones to protect against interference from point-to-multipoint high-density applications in the fixed service operating in bands around 43 GHz (04/2006) | This Recommendation provides a methodology which may be used to derive exclusion zones around radio astronomy sites for transmitting point-to-multipoint (P-MP) high density applications in the fixed service (HDFS) which may be used by administrations in national and bilateral discussions as method to protect radio astronomy sites from potential interference from P‑MP HDFS stations. |
| F.1819 | Protection of the radio astronomy service in the 48.94-49.04 GHz band from unwanted emissions from HAPS in the 47.2-47.5 GHz and 47.9-48.2 GHz bands (09/2007) | This Recommendation provides a minimum separation distance between a radio astronomy station and the nadir of a HAPS platform in order to protect radio astronomy stations operating in the band 48.94-49.04 GHz from unwanted emissions of high altitude platform stations (HAPS) operating in the 47.2‑47.5 GHz and 47.9-48.2 GHz bands. |

Section 1D6 Antenna radiation patterns

| **No** | **Title** | **Scope** |
| --- | --- | --- |
| F.699-7 | Reference radiation patterns for fixed wireless system antennas for use in coordination studies and interference assessment in the frequency range from 100 MHz to about 70 GHz (04/2006) | This Recommendation provides reference radiation patterns for, and information on, fixed wireless system antennas in the frequency range from 100 MHz to about 70 GHz. This information may be used in coordination studies and interference assessments when particular information concerning the FWS antenna is not available. |
| F.1245-2 | Mathematical model of average and related radiation patterns for line-of-sight point-to-point fixed wireless system antennas for use in certain coordination studies and interference assessment in the frequency range from 1 GHz to about 70 GHz (03/2012) | This Recommendation provides average and related reference radiation patterns for line-of-sight point-to-point fixed wireless system (FWS) antennas in the frequency range from 1GHz to about 70 GHz. The analysis in this Recommendation may be used in certain coordination studies and interference assessments when particular information concerning the FWS antenna is not available. |
| F.1336-3 | Reference radiation patterns of omnidirectional, sectoral and other antennas in point-to-multipoint systems for use in sharing studies in the frequency range from 1 to about 70 GHz (03/2012) | This Recommendation gives reference models of the peak and average antenna patterns of omnidirectional, sectoral and directional antennas in point-to-multipoint systems to be used in sharing studies in the frequency range 1 GHz to about 70 GHz. |

\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The term “BAS” also known as services ancillary to broadcasting (SAB) is defined in Report ITU‑R BT.2069. [↑](#footnote-ref-1)