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Guidelines for a process to address the deployment of area-licensed fixed wireless systems operating in neighbouring countries

F Series

Fixed service

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Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

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RECOMMENDATION ITU-R F.1671*

Guidelines for a process to address the deployment of area-licensed fixed wireless systems operating in neighbouring countries

(2004)

Scope

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.

The ITU Radiocommunication Assembly,

considering

a) that in some neighbouring countries the same frequency band may be shared by fixed wireless systems (FWSs);

b) that FWS operators are often licensed by service areas and are allowed to deploy facilities anywhere within their licensed service areas;

c) that the concept of coordination area would be useful in avoiding undue interference between fixed service (FS) stations;

d) that some guidelines to determine such a coordination area would be useful;

e) that such guidelines should be applicable to any frequency band;

f) that in order to minimize interference from systems operating within close geographical proximity of each other, operator-to-operator coordination is very important;

g) that some existing procedures to determine the coordination area for fixed terrestrial services may identify stations for which detailed interference studies may not be required;

h) that the interest of both existing and new systems should be taken into consideration when developing an agreement[1] process,

noting

a) that FS-FS coordination between countries is no longer available in the Radio Regulations as decided by WARC-79,

recommends

1 that with the agreement of administrations concerned, the examples in Annex 1 may be used as guidelines for a process to address the deployment of area-licensed FWSs operating in neighbouring countries in the same frequency band.

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* Radiocommunication Study Group 5 made editorial amendments to this Recommendation in 2009 in accordance with Resolution ITU-R 1.

[1] For the purposes of this Recommendation, the term “agreement” refers to the agreement reached or to be reached, including the coordination trigger levels, bilaterally or multilaterally, by area-licensed FWS operating in neighbouring countries in the same frequency band.

Annex 1

Guidelines for a process to address the deployment of area-licensed FWS operating in neighbouring countries

1 Introduction

Certain FWS have been licensed on an area basis in a number of administrations. Since these systems are licensed on an area basis, coordination methods are not available. There are many ways to address this. This Annex provides information on a process to address the deployment of area-licensed FWS.

These agreement processes can be applied between administrations where FWS are licensed near the border area(s), or domestically between the different operators for concerned areas. With the agreement of administrations concerned, the processes described in this Recommendation may be used as a guideline.

2 Background

Operators of FWS are often licensed by service areas and are allowed to deploy systems anywhere in that area. Operators of these systems are licensed by frequency blocks on a geographical basis.

In order to facilitate fast deployment of FWS, the agreement processes described here highly encourage operator-to-operator coordination and minimal government involvement. Agreement procedures similar to the ones described here are already in place between operators in domestic administrations and between certain countries.

Within each service area, there may be more than one licensee operating on different frequency channels/blocks (co-area/adjacent channel). Licensees operating in different service areas may also operate on the same channel (adjacent area/co-channel) or on different frequency channels/blocks (adjacent area/adjacent frequency). In order to minimize interference, it is important that operators communicate closely and cooperate with each other for successful deployment. The following section describes a possible solution for the agreement process.

3 Agreement process

3.1 Agreement process for adjacent-area/co-channel cases

3.1.1 Operator-to-operator mutual agreement

Licensees operating within an adjacent area or certain distance of each other are encouraged to develop mutually acceptable agreements concerning any potential interference issues before deployment. In the event that such an agreement has not been developed, a single or dual pfd agreement procedure is used.

3.1.2 Option 1: Dual pfd coordination triggers

3.1.2.1 Distance as an initial coordination trigger

The pfd agreement procedure is triggered by a distance parameter, *X* km. (For example, 60 km in bands above 20 GHz.) This distance represents the maximum distance from the boundary of the licensed area at which interference is a concern. It is based on radio line-of-sight derived from

typical base station and subscriber station parameters. If the shortest distance between the respective service area boundaries is less than the trigger distance then the operators are required to initiate the agreement process.

3.1.2.2 pfd at the service area boundary

If the shortest distance between the respective service area boundaries is less than the trigger distance *X*, then the operators are required to initiate the agreement process. Operators are then required to determine the pfd level at the affected licensee's service area boundary. It should be noted that the pfd level is calculated on a per transmitter basis, as opposed to an aggregate basis. The objective of the agreement process is to minimize unnecessary coordination that may delay deployment and, at the same time, protect the interest of existing and future systems. In this regard, a dual pfd level agreement process is used.

3.1.2.3 Less than or equal to pfd A

Transmitters generating a pfd level less than a specified pfd A level at the affected licensee's service area boundary do not require coordination prior to deployment. The pfd A level should be set based on appropriately conservative technical assumptions to ensure a very low probability of interference into the affected receiver. This allows for quick deployment of new systems.

3.1.2.4 Greater than pfd A and less than or equal to pfd B

Transmitters generating a pfd level greater than pfd A (as determined above) and less than a specified pfd B at the boundary of the affected licensee's service area are required to proceed to the next stage of the process, i.e. notification of the affected operators. If there is no objection raised within the agreed time-frame mentioned in the agreement, the deployment may proceed.

While pfd A allows for quick deployment, it is based on conservative assumptions that may unnecessarily constrain system performance. The pfd B level is set at 20 dB higher than pfd A. This 20 dB margin allows operators more flexibility in deployment since unnecessary coordination could be avoided by the notification.

Practical mitigation and siting measures can be used to avoid harmful interference. Only licensees with affected existing operating stations may object to such deployment. Objections based on non-operating stations or planned facilities are not valid for pfd levels less than B.

3.1.2.5 Greater than pfd B

Transmitters generating a pfd level greater than pfd B at the boundary of the affected licensee's service area are required to directly coordinate before deployment. A pfd level greater than pfd B represents a high probability of interference between systems. The affected licensees may object to the deployment of such a proposed station in which case deployment may not proceed.

3.1.2.6 Areas with high deployment of existing point-to-point (P-P) systems

In certain frequency bands or geographic areas, a high deployment of P-P systems may already exist. These P-P systems tend to have higher receiver gain and higher antenna directivity than point-to-multipoint (P-MP) systems. In order to allow for the continued existence of these P-P systems, the determination of the pfd A level should take into account their system characteristics.

In order to ensure equitable access to the frequency spectrum by both P-P and P-MP systems, the pfd A level should be calculated based on P-P system parameters. Other factors may also need to be considered when determining the appropriate pfd A. For example, highly directive narrow beam emissions are often employed by P-P systems in the bands above 20 GHz, and this tends to reduce the probability of direct coupling. Such factors should be taken into account when determining the appropriate pfd A level.

3.1.2.7 Examples of pfd A and pfd B

Table 1 gives examples of pfd A and pfd B for systems operating in the bands 24/28 GHz and 38 GHz.

TABLE 1

Examples of pfd A and pfd B (in any 1 MHz)

Frequency bands (GHz)		pfd A ($dB(W/m^2)$)	pfd B ($dB(W/m^2)$)
24	24.25-24.45 25.05-25.25	–114	–94
28	25.35-28.35		
38	38.6-40	–125[(1)]	–105

(1) The pfd A level for the 38 GHz band was determined taking into account P-P systems.

A more detailed agreement procedure for § 3.1.2.1 is as shown in Appendix 1.

3.1.3 Option 2: Single pfd coordination trigger

3.1.3.1 Distance and pfd triggers for coordination

The pfd agreement procedure is triggered by a distance parameter, *Y* km, and associated pfd levels at this point. (For example, 15 km in the 26 GHz band and 25 km in the 28 GHz band. However, in a typical situation, comparing similar services, the distance would decrease as the frequency increases.) This distance represents the maximum distance from the boundary of the affected licensed area at which interference is a concern.

Operators are required to determine the pfd trigger at distance *Y* from the affected service area boundary. The objective of the pfd limit is to minimize unnecessary coordination that may delay deployment and, at the same time, protect the interest of existing and future systems. It should be noted that the pfd level is calculated on a per transmitter basis, as opposed to an aggregate basis.

At distance *Y* the pfd must be evaluated to determine whether or not it is below a band-specific trigger. All systems used by the operator must be coordinated to meet the pfd level. *Y* km from the boundary of a service area, a further area-licence with the same frequency or frequency block can be allocated to another operator, no equivalent pfd (epfd) evaluation is necessary. Inside *Y*, but outside the boundary of the affected service area, the adjacent frequency-channels (blocks) may be allocated to two operators without coordination. For two licensees within the same area a guardband in the size of the maximum channel bandwidth is necessary to reduce (avoid) interference problems without coordination.

3.1.3.2 Less than or equal to pfd trigger

Transmitters generating a pfd level less than a specified pfd trigger at the defined distance from the boundary of the service area do not require any further coordination prior to deployment. The pfd is set based on appropriately conservative technical assumptions to ensure a very low probability of interference into the affected receiver. This allows for quick deployment of new systems.

3.1.3.3 Above pfd trigger

Where possible, operators should design their systems so that this level is not exceeded. If this is not the case the affected licensees are requested to coordinate directly before deployment.

Table 2 gives examples of pfd for systems operating in the bands 26 GHz and 28 GHz.

TABLE 2

Examples of distance and pfd (in any 1 MHz)

Frequency bands (GHz)		Distance *Y* from the affected service area boundary (km)	pfd (dB(W/m^2))
26	24.5-26.5	15	–110
28	27.5-29.5	25	–115[(1)]

(1) The pfd for the 28 GHz band was determined taking into account that P-P and P-MP systems are in the same area.

3.2 Agreement process for adjacent-area/adjacent-channel cases

In these cases, coordination is not needed most of the time. But to avoid interference it would be helpful that the procedure described in § 3.1 should be taken into account, if parts of two licensed areas are within the coordination distance. The pfd level could be higher, or the distance could be shorter, relative to the co-channel configuration.

3.3 Coordination with service areas that have not been licensed

3.3.1 Dual pfd coordination

In order to protect the interest of new entrants for service areas that have not been licensed, operators should ensure that the pfd level at the unlicensed service areas does not exceed pfd B.

3.3.2 Single pfd coordination

In order to protect the interest of new entrants, the pfd triggers described in Table 2 should not be exceeded.

4 Conclusion

The agreement procedures as presented above represent an innovative way to encourage operator-to-operator communication, which promotes efficient deployment without unnecessary constraint for area-licensed FWS. A more detailed agreement procedure for § 3.1.2 is shown in Appendix 1.

Appendix 1
to Annex 1

Example of agreement process for area-licensed FWS described in § 3.1.2

1 Coordination is required between licensed service areas where the shortest distance[2] between the respective service area boundaries is less than *X* km. Operators are encouraged to arrive at mutually acceptable sharing agreements that would allow for the provision of service of each licensee within its service area to the maximum extent possible.

2 When a sharing agreement does not exist or has not been concluded between operators whose service areas are less than *X* km apart, the following agreement process should be employed:

2.1 Operators are required to calculate the pfd at the service area boundary of the affected service area(s) for the transmitting facilities. The pfd is calculated using accepted engineering practices, taking into account such factors as propagation loss, atmospheric loss, antenna directivity toward the service area boundary and curvature of the Earth. The pfd level at the service area boundary should be the maximum value for elevation points up to 500 m above local terrain elevation.

2.2 Deployment of facilities that generate a pfd less than or equal to pfd A at the other service area boundaries is not subject to any coordination requirements.

2.3 Deployment of facilities that generate a pfd greater than pfd A, but less than or equal to pfd B at the other service area boundaries, is subject to successful coordination between the affected licensees in accordance with the following agreement process:

2.3.1 The operator should notify the respective licensee(s) of its intention to deploy the facility(ies) and submit the information necessary to conduct an interference analysis.

2.3.2 The recipient of the notification should respond within 30 calendar days to indicate any objection to the deployment. Objection may be based on harmful interference to existing systems[3] only.

2.3.3 If there is no objection raised, the deployment may proceed.

2.3.4 If an objection is raised, the respective licensees should work in collaboration to reach a suitable agreement before the deployment of facilities. It is expected that the time-frame to develop such an agreement should not exceed 30 calendar days.

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[2] The coordination trigger distance may be the radio line-of-sight distance calculated based on typical parameters.

[3] Existing systems include systems that are operational prior to receipt of the notification, or systems that have previously been coordinated.

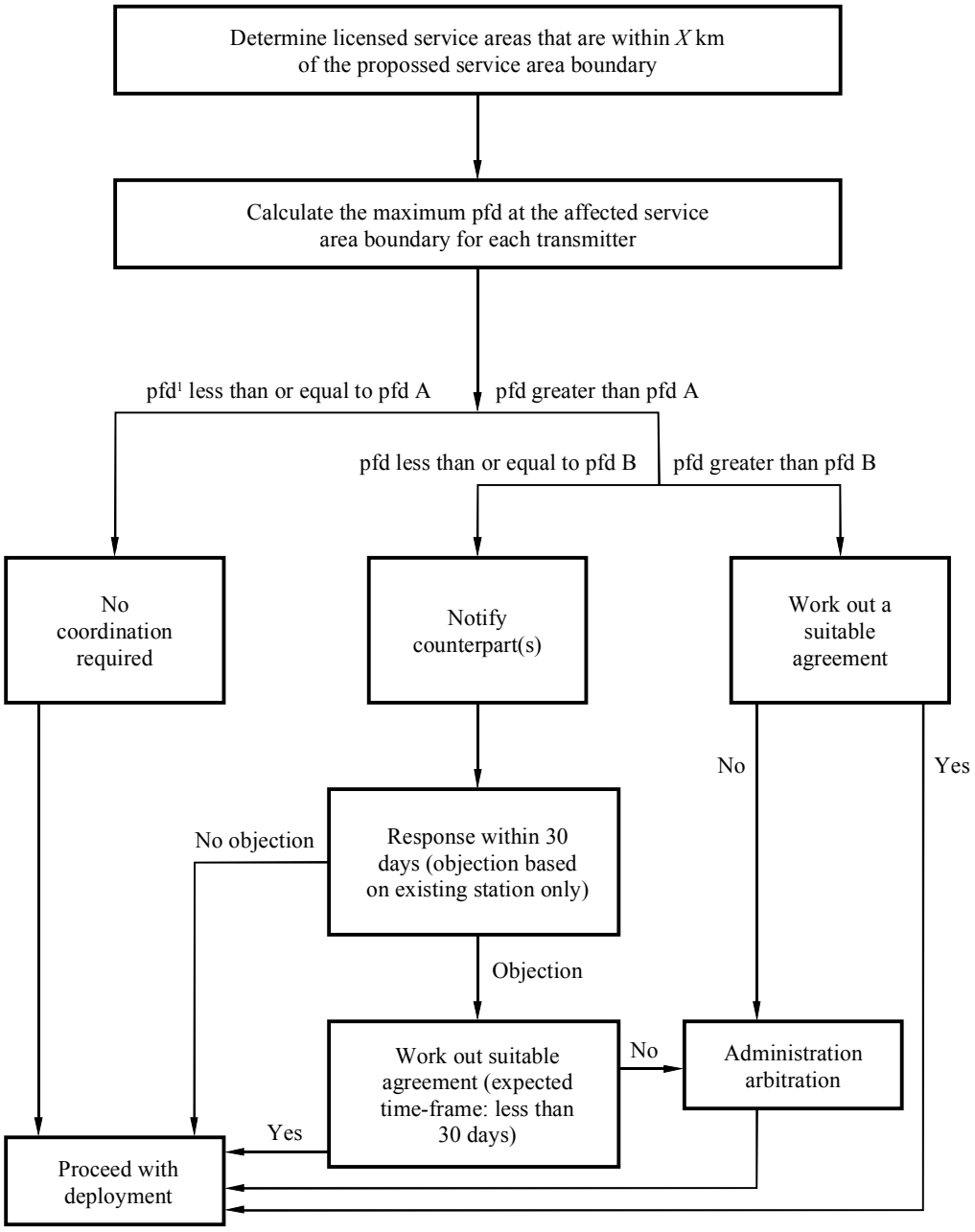
2.3.5 Proposed facilities should be deployed within 120 calendar days of the conclusion of coordination, otherwise coordination should be reinitiated as per § 2.

2.4 Deployment of facilities that generate a pfd greater than pfd B at the other service area boundaries is subject to successful coordination between the affected licensees.

3 The above process is described graphically in Fig. 1.

FIGURE 1

Agreement process for cases where a sharing agreement between the licensees has not been concluded



(1) pfd is calculated at the service area boundary of the respective counterpart(s).

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4 In any event, licensees are expected to take full advantage of interference mitigation techniques such as antenna discrimination, polarization, frequency offset, shielding, site selection, and/or power control to facilitate the coordination of systems.

5 All results of analyses on pfd and agreements made between licensees should be retained by the licensees and made available to the respective administration(s) on request.

6 If a licence is transferred, the sharing agreement(s) developed between the former licensees should remain in effect until superseded by a new agreement between the licensees.

7 In the event a satisfactory agreement or successful coordination between the licensees is not reached, the respective administration(s) should be informed. In these cases, the administration may impose appropriate technical limitations to facilitate reasonable implementation of systems.

8 Licensees should ensure that the pfd at the boundary of unlicensed neighbouring service areas does not exceed pfd B.

9 While coordination between adjacent block licensees operating in the same vicinity may not be required in most cases, licensees may agree to coordinate certain installations to avoid interference.