

IEEE Project 802
LAN/MAN Standards Committee

ITU-R CPM Draft

Date: July 23, 2001

To: US JTG 4-7-8-9
US JRG 8A/9B
IWG 5

IEEE Project 802, the Standards Committee for Local and Metropolitan Area Networks, and its 3 Working groups, IEEE 802.11 for Wireless Local Area Networks, IEEE 802.15 for Wireless Personal Area Networks and IEEE 802.16 for Broadband Wireless Access, support the current CPM draft text for agenda item 1.5 resolves 1 as accepted in the Cleveland Ohio June 2001 ITU-R JTG 4-7-8-9 meeting.

An abstract of the JTG 4-7-8-9 is attached with our proposal for additional text. It is marked to readily identify the additions. We respectfully request the US to adopt the proposal for its own position.

The European community has conducted studies that identify future spectrum requirements and has identified that the spectrum 5150-5350 MHz and 5470-5725MHz is required to support anticipated requirements in the 2005 and 2010 time frame. Sharing studies show that the incorporation of Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC) provides added margin for spectrum sharing.

HIPERLAN2, MMAC, IEEE 802.11 have undertaken studies to support harmonization of technologies with intent to develop a world standard for RLANs.

Global spectrum harmonization will result in enabling the global market for wireless access systems. A global market results in opportunities to Design Anywhere — Build Anywhere — Sell Anywhere — Use Anywhere .

If you have any questions, please do not hesitate to contact Vic Hayes, the Regulatory Ombudsman of IEEE Project 802.

Respectfully submitted

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Joint Task Group 4-7-8-9

DRAFT CPM TEXT - CHAPTER 2

Mobile, mobile-satellite and space science services

2.2 Agenda item 1.5

"to consider, in accordance with Resolution 736 (WRC-2000), regulatory provisions and spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite and space research services, and to review the status of the radiolocation service in the frequency range 5°150-5°725°MHz, with a view to upgrading it, taking into account the results of ITU-R studies;"

Resolution 736 (WRC-2000) *resolves*:

- 1 allocation of frequencies to the mobile service in the bands 5 150-5 350°MHz and 5°470-5°725 MHz for the implementation of wireless access systems including RLANs;
- 3 additional primary allocations for the Earth exploration-satellite service (active) and space research service (active) in the frequency range 5 460-5 570 MHz;
- 4 a review, with a view to upgrading, of the status of frequency allocations to the radiolocation service in the frequency range 5 350-5 650 MHz.

2.2.1 Background

2.2.1.1 Wireless access systems in the mobile service including RLANs

The term "RLAN", Radio Local Area Network describes an untethered radio communication system; some examples of RLAN standards are ARIB HiSWANa, ETSI HiperLAN/2 and IEEE 802.11a, which support data rates from 6 Mbit/s to 54 Mbit/s. Generally, RLANs connect portable devices with broadband networks that are based on IP, ATM or other technologies. An application of RLANs make it possible to get wireless LAN access to an Intranet and/or the Internet with comparable performance to a stationary wired LAN. Furthermore, RLAN systems are potentially capable of supporting multi-media applications with their QoS requirements. User mobility at pedestrian speed and handover of connection between access points are supported within the local service area.

RLANs may thus be considered to fall into the ITU-R categories Nomadic Wireless Access (NWA) or Mobile Wireless Access (MWA).

RLANs are usually deployed in geographically limited areas. Office or indoor environments have very small radio cells on the order of 30 meter radius or less. Outdoor use has a larger cell radius of typically 3 to 4 times the indoor cell radius as shown above. Typical applications include public and private wireless access offered in schools, hospitals, hotels, conference centres, airports, shopping centres etc.

[The European community has conducted studies that identify future spectrum requirements and has identified that the spectrum 5150-5350 MHz and 5470-5725MHz is required to support anticipated requirements in the 2005 and 2010 time frame. Sharing studies show that the incorporation of Dynamic Frequency Selection \(DFS\) and Transmit Power Control \(TPC\) provides added margin for spectrum sharing.](#)

[HIPERLAN2, MMAC, IEEE 802.11 have undertaken studies to support harmonization of technologies with intent to develop a world standard for RLANs.](#)

[Global spectrum harmonization will result in enabling the global market for wireless access systems. A global market results in opportunities to Design Anywhere — Build Anywhere — Sell Anywhere — Use Anywhere.](#)

[IEEE supports this spectrum allocation.](#)

2.2.2 Summary of spectrum sharing studies

The following Recommendations are based on the results of the ITU-R studies:

Recommendation ITU-R M.1454: "e.i.r.p. Density Limit and Operational Restrictions for RLANs or Other Wireless Access Transmitters in order to Ensure the Protection of Feeder Links of Non-Geostationary Systems in the Mobile Satellite Service in the Frequency Band 5°150-5°250 MHz".

Recommendation ITU-R S.1426: "Aggregate Power Flux-Density Limits at the FSS Satellite Orbit for Radio Local Area Network (RLAN) Transmitters Operating in the 5 150-5 250 MHz Band Sharing Frequencies with the FSS (RR No. S5.447A)".

Recommendation ITU-R S.1427: "Methodology and Criterion to Assess Interference from Radio Local Area Network (RLAN) Transmitters to Non-GSO MSS Feeder Links in the Band 5°150-5 250 MHz".

[PDNR M.[RLAN5GHz-eess]: "e.i.r.p. limit and operational restrictions for RLANs or other wireless access transmitters in the mobile service in order to ensure the protection of systems in the Earth exploration-satellite service (active) in the band 5 250-5 350 MHz".

[Additional spectrum sharing studies are in progress and will be reported in updates to this paper.](#)

Working document toward PDNR "Methodology for accessing the required spectrum for generic broadband NWA networks (RLANs) (Source: Document 8A-9B/205, page 97)".

PDNR [FWA5GHz-eess]: "Operational and deployment restrictions for fixed wireless access (FWA) systems in Region 3 to ensure the protection of systems in the Earth exploration satellite service (active) in the band 5 250-5 350 MHz".

PDNR SA.[sharingRLAN-eess]: "Sharing in the band 5 250-5 350 MHz between the Earth exploration-satellite service (active) allocated in this band and the radio local area networks (RLANs)"

Recommendations ITU-R F.1399, 1400, 1401, 1490, 1499, Draft Rec. ITU-R [Doc. 9/4].

Preliminary draft new Recommendation [Doc. 7C/TEMP/11] contains sharing studies between the Earth exploration-satellite (active), space research (active) and other services allocated in the band 5°250-5 570 MHz.

Recommendation ITU-R SA.1166 contains the performance and interference criteria for active spaceborne sensors in some frequency bands.

Recommendation ITU-R SA.1280 addresses selection of active spaceborne sensor emission characteristics to mitigate the potential for interference to terrestrial radars operating in frequency bands from 1 to 10 GHz.

Preliminary draft new Recommendation ITU-R M.[8B-CHAR] Characteristics of and protection criteria for radiolocation, aeronautical radionavigation, and meteorological radars operating the frequency bands between 5250 and 5850 MHz

Recommendation ITU-R M.1450 Characteristics of broadband radio local area networks (RLANs) (And ITU-T Recommendations, if appropriate.)

2.2.3 Analysis of studies

2.2.3.1 Analysis of studies relevant to Resolution 736 (WRC-2000), *resolves 1*

2.2.3.1.1 Sharing between mobile service and mobile-satellite service feeder links

The topic of interference from Radio Local Area Networks (RLANs) into the Feeder Links of Non-Geostationary (non-GSO) Mobile-Satellite Service (MSS) Systems was fully investigated during the 1998-2000 ITU-R study period. These studies resulted in the creation of three Recommendations ITU-R M.1454, ITU-R S.1426 and ITU-R S.1427. These Recommendations provide guidance on e.i.r.p. density, operational restrictions, power flux-density limits and the methodology for assessing interference from RLANs into non-GSO MSS Feeder Links. In light of these results there is no need for further study. Regulatory means to ensure the protection of non-GSO MSS Feeder Links from RLAN transmissions are found in Section 2.3 of this Report. [Editor's Note: Taking into account progress in WP 4A for Section 2.3, modifications may be needed.]

2.2.3.1.2 Sharing between mobile (RLAN) and Earth Exploration-Satellite (active) Services

[Band 5 250—5 350 MHz

Based on the PDNR M.[RLAN 5GHz-eess] sharing between the mobile service (RLAN), and the EESS (active) and SRS (active) in 5°250-5°350 MHz appears to be feasible with the following constraints:

RLAN equipment is only used indoors

RLAN is limited to a maximum mean (over the transmission burst at the highest TPC setting) EIRP of 200 mW

Both Transmitter Power Control (TPC) and Dynamic Frequency Selection (DFS) are implemented in RLANs.

[Editor's Note: Studies are in progress within WP 7C and JRG 8A-9B.]

(Additional text to be developed)

[2.2.3.1.2 Sharing between mobile (RLAN) and Earth exploration-satellite (active) services-*bis*]

[Band 5 250—5 350 MHz

Based on demonstrated operational experience and PDNR M.[RLAN-directional 5GHz-EESS] sharing between wireless access systems including RLANs in the mobile service and the EESS (active) and SRS (active) in 5°250-5°350 MHz appears to be feasible. RLAN equipment can be operated both indoors or outdoors. However, the following technical parameters of RLAN systems must be constrained:

- RLAN is limited to a maximum mean (over the transmission burst at the highest TPC setting) EIRP of [x] W

EIRP spectral density of the emission of a RLAN transmitter should not exceed the following values in any 1MHz band for the elevation angle θ above the local horizontal plane:

[Y] dBW for $[0^\circ \leq \theta \leq 5^\circ]$

[Z — $10\log(\theta/5)$] dBW for $[5^\circ \leq \theta \leq 90^\circ]$

[Editor's Note: Studies are in progress within WP 7C and JRG 8A-9B.]

(Additional text to be developed)

Band 5 470—5 570 MHz

Sharing between the mobile service (RLAN), and the EESS (active) in 5°470-5°570 MHz

(Additional text to be developed)

2.2.3.1.3 Sharing between mobile (RLAN) and radionavigation services

Aeronautical radionavigation in 5°150-5°250 MHz

No administrations have expressed any current or planned aeronautical radionavigation usage in this band.

Maritime radionavigation service and weather radar systems in 5°470-5°650 MHz

Studies are under way to determine what interference avoidance techniques might facilitate sharing between RLANs and radars.

One method that could facilitate sharing in the use of this band is Dynamic Frequency Selection (DFS). This implies that a RLAN device/cell would be able to avoid the RLAN channels used by a radar system if DFS can detect all types of radar systems in the band.

The specification of the DFS mechanism must take into account the characteristics of the various radar systems operating in the 5 GHz bands (e.g. wideband, low probability of interception, frequency agile and short pulsed radars). It should also be noted that radar operations (e.g. tracking radars) can be intermittent and should also be taken into consideration. It was noted that radar density has a significant influence on the feasibility of sharing, as does the nature of the radar, e.g., whether it is fixed or transportable. Deployment density of the RLANs may also have significant effect on radar operations.

Testing is required to confirm the ability of interference avoidance mechanisms (e.g., DFS) to detect the radar types in this band. In addition, studies are required on spurious emission coupling of RLANs into existing radar systems.

In conclusion, RLANs may be able to share this band provided an appropriate interference mitigation mechanism is implemented.

[Editors Note: This text will be reviewed at a Joint Experts Meeting between JRG 8A-9B and WP 8B in October 2001.]

2.2.3.1.4 Sharing between mobile (RLAN) and radiolocation services

One method that could facilitate sharing in the use of this band is Dynamic Frequency Selection (DFS). This implies that a RLAN device/cell would be able to avoid the RLAN channels used by a radar system if DFS can detect all types of radar systems in the band.

The specification of the DFS mechanism must take into account the characteristics of the various radar systems operating in the 5 GHz bands (e.g. wideband, low probability of interception, frequency agile and short pulsed radars). It should also be noted that radar operations (e.g. tracking radars) can be intermittent and should also be taken into consideration.

It was noted that radar density has a significant influence on the feasibility of sharing, as does the nature of the radar, e.g., whether it is fixed or transportable. Deployment density of the RLANs may also have significant effect on radar operations.

Testing is required to confirm the ability of interference avoidance mechanisms (e.g., DFS) to detect the radar types in this band. In addition, studies are required on spurious emission coupling of RLANs into existing radar systems.

In conclusion, RLANs may be able to share this band provided an appropriate interference mitigation mechanism is implemented.

[Editors Note: This text will be reviewed at a Joint Experts Meeting between JRG 8A-9B and WP 8B in October 2001.]

2.2.3.3.3 Sharing between EESS (spaceborne active sensors) and mobile (RLANs) service in the band 5°470-5°570 MHz

A study has been performed on sharing between spaceborne wideband SARs and RLANs, based on aggregate interference in both bands 5 250-5 350 MHz and 5 470-5 570 MHz. The technical characteristics of the RLANs in the 5 470-5 570 MHz includes 1 W peak e.i.r.p., 15% outdoors deployment, omni-directional antennas, 16 MHz bandwidth, and 5% operational active/passive ratio. [It is concluded from this analysis that the spaceborne wideband SARs can suffer interference from RLANs but that the sharing is improved if the e.i.r.p. of the RLANs is reduced by 6 dB or more. It is further concluded that only EESS (active) sensors with bandwidths greater than 100°MHz will be deployed in the band 5 470-5 570 MHz, correspondingly raising the permissible interference threshold by 5 dB or more, and hence easing the sharing situation.]

[Editor s Note: Studies are ongoing within WP 7C and JRG 8A-9B.]

2.2.4 Methods to satisfy the agenda item

2.2.4.3 Methods to satisfy the agenda item related to Resolution 736 (WRC-2000), resolves 3

Based on the technical and operational studies that have been conducted, WRC-03 can consider establishing common worldwide primary allocations for space-based active sensors operating in the Earth exploration-satellite (active) and space research (active) services in the frequency band 5°460-5 570 MHz where compatibility exists with the radiolocation and the radionavigation services. [**Note:** Additional text to be developed.]