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Abstract	Problem description and solutions to be included in the standard
Purpose	Support of channel spacing comment - 802.16a_D2 draft
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Proposal for one mandatory channel spacing, in license exempt bands, for 802.16a systems

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Introduction

Currently, the draft specifies, for license-exempt frequencies, mandatory support of 20MHz and 10MHz channel spacing. A discussion of deployment scenarios will be made for the mandatory bands, with the scope to show that there are not enough 20MHz channels in order to permit the operation of minimum 2 systems.

In order to permit the co-existence of more systems in the same frequency bands, an inter-AU protocol will be proposed.

Available spectrum

It is shown (pag.188), that it is possible to operate the 802.16 systems only under FCC regulations. The middle U-NII sub-band accommodates 3 channels (+1 optional) of 20MHz, while the upper U-NII band supports 4 channels.
Each of the middle and upper U-NII bands accommodate 8 channels of 10 MHz and 18 channels of 5MHz.
The link budget, according to transmitted power density limitations, is the same for a given band, being independent of channel bandwidth.
The maximum power is allowed in the upper band -36dBm EIRP-, as compared with 30dBm EIRP for the middle band.

Table 231—Channelizations

Regulatory domain	Band (GHz)	Channelization (MHz)		
		20	10	(5)
USA	U-NII middle 5.25 -5.35	(104), 112, 120, 128, (136)	(102), 106, 110, 114, 118, 122, 126, 130, 134, (138)	(103), (105), (107), (109), (111), (113), (115), (117), (119), (121), (123), (125), (127), (129), (131), (133), (135), (137)
	U-NII upper 5.725-5.825	298, 306, 314, 322, 330[a]	(292), 296, 300, 304, 308, 312, 316, 320, 324,(328),332[a],336[a]	(293), (295), (297), (299), (301), (303), (305), (307), (309), (311), (313), (315), (317), (319), (321), (323), (325), (327),(329)[a],(331)[a], (333)[a],(335)[a]

Channel number and frequency reuse for P-MP and Mesh topologies

The P-MP systems can achieve a reuse of 1 with a minimum of 4 sectors, bringing to 4 needed channels in cellular deployment.
The Mesh system needs at least 4 channels and achieves a frequency reuse of 3 (BRAN27d012), due to the use of omni-directional antennae. For cellular deployment these systems will need minimum 12 channels.

In order to allow for minimum 2 operators to deploy 802.16 systems in the same area, will be needed:

Operator 1	Operator 2	Needed Channels
P-MP	P-MP	4+4
P-MP	Mesh	4+3+guard
Mesh	Mesh	3+3+guard

The obvious conclusions are:

- When using P-MP systems, 20MHz channel spacing will not give enough bandwidth for 2 operators; besides, the power limitations make only 4 of the channels (upper bands) attractive for operators;
- When using mesh systems, the operation in line of sight condition will force the system to work in QPSK mode, reducing drastically the PHY rate. Higher performance will be possible to achieve with 10MHz channel, using higher modulations;
- If other ISM/UNII users will occupy some of the 20MHz channels, the 802.16 systems will not have enough channels for operations.

Channelization in license-exempt bands - proposal

Based on previous results, and taking into account the existing mandatory 20MHz and 10MHz channelization, it is proposed to keep only the 10MHz, as mandatory channelization in the standard. The 20MHz channelization will not provide a sufficient number of channels to enable the 802.16 market. Nevertheless, the 20MHz and 5MHz channel spacing can be kept as optional.

Designing equipment for 3.5GHz or MMDS, where the actual channel spacing will not exceed 6MHz, is very different from designing a 20MHz system. 5MHz will be from this point of view more suitable. Nevertheless, in order to compete with the throughput of 802.11 systems, it is better to choose 10MHz as the mandatory band of 802.16 systems.

Having only one mandatory band (10MHz) will enable the chip makers to provide full solutions, as in 802.11, at very low prices, contributing to the standard adoption by the access market.