



FCC Docket 04-151

3650-3700 MHz

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Status

March 2005 Decision



- **Each applicant would receive a non-exclusive nationwide license to use the band under the conditions that they (47 CFR 90.1307):**
 - Register individual fixed and base stations
 - Employ a contention based protocol (CBP), (47 CFR 90.1319(b))
 - Cooperate in the selection and use of frequencies in order to make the most effective use of the authorized facilities
- **Power antenna limits (47 CFR 90.1321):**
 - Base and fixed stations are limited to EIRP of 25 W/25 MHz and peak EIRP of 1 W/MHz.
 - Mobile and portable devices are limited to EIRP of 1 W/25 MHz and peak EIRP of 40 mW/MHz.
- **The CBP is defined as (47 CFR 90.7):**
 - Contention-based protocol. A protocol that allows multiple users to share the same spectrum by defining the events that must occur when two or more transmitters attempt to simultaneously access the same channel and establishing rules by which a transmitter provides reasonable opportunities for other transmitters to operate. Such a protocol may consist of procedures for initiating new transmissions, procedures for determining the state of the channel (available or unavailable), and procedures for managing retransmissions in the event of a busy channel.
 - Coordinate any use with-in 150 km of grandfathered FSS earth stations and 80 km of protected Federal Government radiolocation facilities.
- **9 Entities filed with the FCC asking them to reconsider their decision**
 - For suppliers CBP is major issue for most looking to provide equipment since there is little information behind what constitutes compliance with a CBP

Contention Based Protocol (CBP)



- **No appropriate CBP exists**
- **Motorola, Intel, Redline, Alvarion, WiMAX Forum and WCAI (Wireless Communications Association International) all wanted the CBP removed**
- **Dynamic Frequency Selection (DFS) CBP used at 5250-5350 / 5470-5725 MHz is not appropriate**
 - Conceptually best fit to Commission goal of CBP at 3650-3700 MHz, senses operation on a channel and will select new channel for use
 - 3 years after the decision by the FCC to open the 5 GHz band the industry/US government had finally come to agreement on what is required for testing
 - The DFS version of CBP only reacts to specified radar signals and will not provide spectrum sharing between other 5 GHz systems
- **WLANs (802.11) have a CBP call CSMA/CA**
 - Carrier Sense Multiple Access with Collision Avoidance – listens for transmissions and if detects that a channel is busy it will wait an random amount of time before attempting to access the media again
 - No measures for selection of a new channel, keeps trying to access same channel
 - CSMA/CA is not implemented in most other standardized technologies, will not provide Quality of Service
 - IEEE Formed Task Group (TGy) to consider 802.11 access for this band

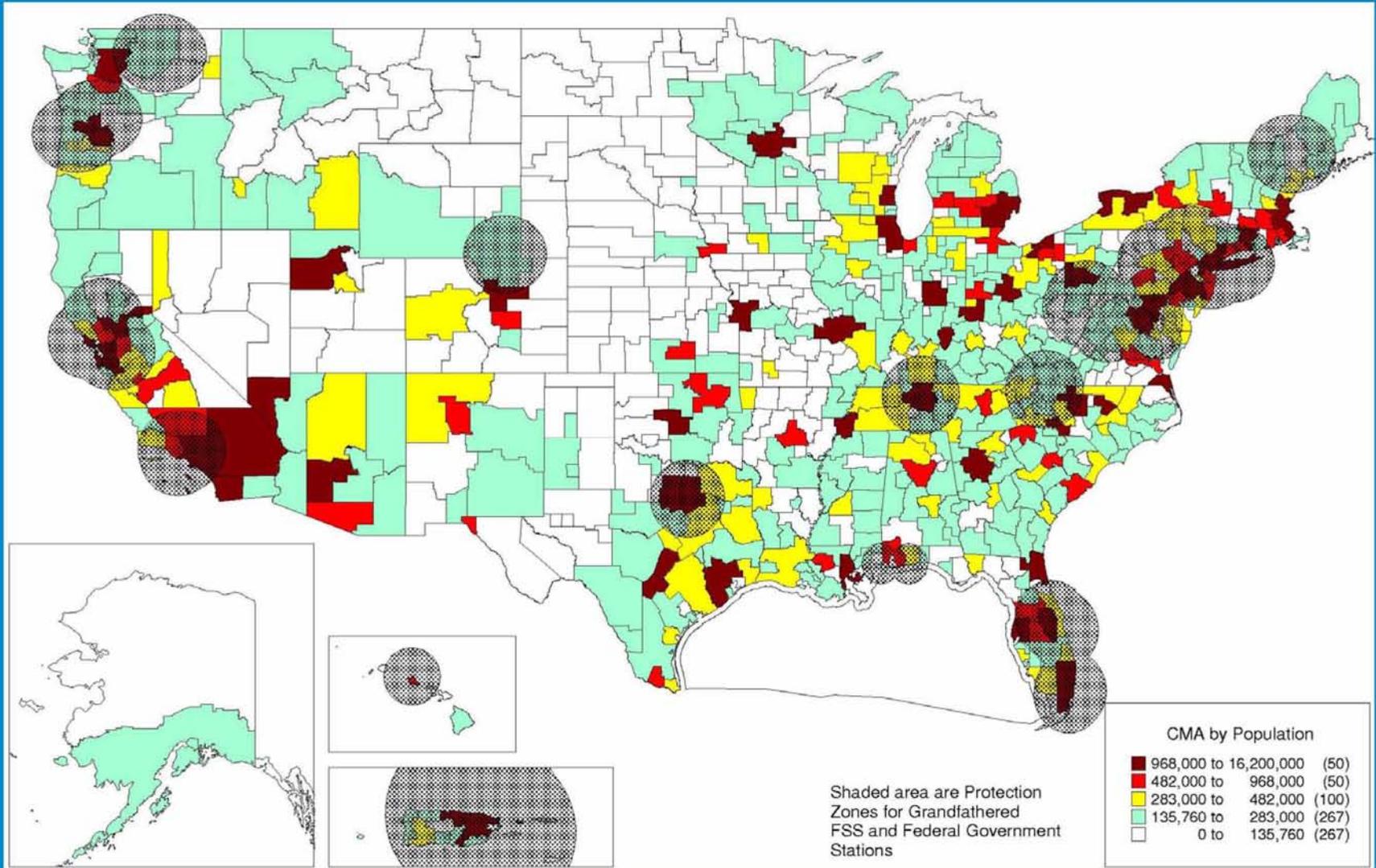
Why not implement a DFS algorithm at 3650-3700 MHz?



- **Goal of CBP in 3650-3700 MHz is to allow multiple systems to gain access to the band on a shared basis in the same geographic area**
 - Will require any DFS algorithm to detect and react to all possible radio access scheme deployed in 3650-3700 MHz
 - Possible methods to achieve
 - **Implementation of a power detector**
 - **Cognitive Radio which adapts to new signals**
- **Experience at 5 GHz**
 - Unlikely that manufactures will implementing a power detector
 - **Rate of false detections will result in high rate of requirement to change frequency**
 - **Solutions implemented are based on characteristics of signals to be detect, adequately defining those signal took Industry/DoD over 3 years**
 - Situation at 3650-3700 MHz is significantly different than at 5 GHz since available spectrum is only 50 MHz as opposed to 580 MHz available in 5150-5850 MHz under part 15

Coordination Zones

Federal Government and Satellite



Satellite Issues



- **Adjacent channel**

- SIA petitioned that the out-of-band emission levels need to be reduced to -71.25 dBW/MHz to protect the thousands of downlink receive terminals operating in the bands above 3700 MHz
- Applying this restrictive emission level could severely constrain any use of the 3650-3700 MHz band
- Propose that FCC follow ETSI standard, products such as WiMAX are complying with when using the 3.5 GHz bands

- **EN 302 326:**

| – Offset from Allocation Edge | Attenuation Level (dB) |
|-------------------------------|------------------------|
| 0 MHz to 15 MHz | $43+10*\log(P)$ |
| 15 MHz to 70 MHz | $60+10*\log(P)$ |
| 70 MHz and beyond | $70+10*\log(P)$ |

- » Measured in 1 MHz bandwidth, but in first MHz immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

How to grant access without FCC specified CBP?



- **Urban Areas**

- Expected that demand for access will be competitive
- Many require coordination with Grandfathered satellite / Federal Government operations
- Satellite Operators concerned with transmit power levels are most likely to be impacted in an Urban area, licensed point-to-point systems will help resolve issue
- Needs for backhaul spectrum

- **Municipal networks**
- **Wireless broadband**
- **Carrier networks**

⇒ **Issue licenses in top urban markets**

- **To ensure maximum efficiency**
 - License blocks of size 32 MHz and 18 MHz, allow licensee to aggregate
 - Build out deadlines to ensure spectrum use

- **Non-Urban Areas**

- Expected that demand would be less
- Needs for delivering for wireless broadband to rural areas

⇒ **Issue non-exclusive licenses via registration procedure for full 50 MHz without FCC mandated contention protocol**

Motorola Proposal



- **License operations but tailor to urban and non-urban areas**
 - In urban areas issue licenses with 32 MHz and 18 MHz blocks
 - Outside urban areas a license-lite (registration will get rights to use entire 50 MHz) will be permitted.
- **For fixed point-to-point licenses in urban areas the links are allowed to transmit EIRP of 25 W/5 MHz (or 5 W/MHz)**
- **Remove any requirements for contention based protocol**
- **To protect satellite operations above 3700 MHz the out-of-band mask starting at 3700 MHz is:**

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- Measured in 1 MHz bandwidth, but in first MHz immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.