National Spectrum Management Association

Fixed Service versus Full-Band, Full-Arc Coordination

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DISCLAIMER: The speaker is counsel to the Fixed Wireless Communications Coalition (FWCC), a party to the proceedings discussed here.
Bands At Issue

- Fixed Service (FS) and Fixed Satellite Service (FSS) share these bands:

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Earth station</th>
<th>Possible Interference</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7–4.2 GHz</td>
<td>downlink</td>
<td>earth station into microwave</td>
</tr>
<tr>
<td>10.7–11.7 GHz</td>
<td></td>
<td></td>
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<tr>
<td>5.925–6.425 GHz</td>
<td>uplink</td>
<td>microwave into earth station</td>
</tr>
<tr>
<td>12.7–13.25 GHz</td>
<td></td>
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</tbody>
</table>

- All bands can also have microwave-into-microwave interference.
Allocations

- All four bands at issue have co-primary allocations to satellite earth stations and fixed microwave:
  - an applicant in either service must protect licensees and prior applicants in both services from harmful interference
  - obligations (in this respect) are symmetrical between the services.
Fixed Microwave Frequency Coordination

- A fixed microwave applicant coordinates:
  - a particular frequency channel
  - a particular azimuth (horizontal pointing direction)
- All other frequencies and directions are available to other applicants
- Station must be loaded to 50% of capacity within 30 months of licensing.
Satellite Earth Station Frequency Coordination – 1

- A satellite earth station applicant (send or receive) routinely coordinates:
  - the entire frequency band (500-1,000 MHz)
  - every pointing direction toward every possible geosynchronous satellite

(looking south)
Satellite Earth Station Frequency Coordination – 2

- By default, fixed earth stations use full-band, full-arc coordination
  - even if accessing only one transponder on one satellite
  - no loading requirement
- Fixed microwave applicants must protect even unused satellite coordinations.
Full-Band, Full-Arc Coordination Dates Back 50 Years

“This [full-band, full-arc] procedure is consistent with the practice followed within the United States which has had little or no adverse effect upon terrestrial systems in the areas concerned.”

Communications Satellite Corp. et al., Memorandum Opinion, Order and Authorization at ¶ 7, 8 F.C.C.2d 1001 (1967).
In downlink bands (4 & 11 GHz):
- exclusion zones are big and hard to avoid
  - include registered 4 GHz receive-only antennas
- fixed microwave barred from large areas

In uplink bands (6 & 13 GHz):
- risky to use vacant channels in an earth station exclusion zone
- the earth station can use it at any time without notice
  - (but uplink exclusion zones are smaller and easier to avoid).
3.7-4.2 GHz Fixed Point-to-Point
(939 links)

5.925-6.425 GHz Fixed Point-to-Point
(57,654 links)

Graphics courtesy George Kizer, data from FCC ULS database May 2015
Fixed microwave coordination at 4 GHz is impossible over much of the United States.
Earth Station Database Issues

- Sample of 300 earth stations
  - study done for the FWCC
- Google and EIBASS independently reached similar results.
Policy Downsides of Full-Band, Full-Arc Coordination

- Earth stations hold spectrum in reserve for possible future use
  - fits definition of “warehousing”
  - not permitted elsewhere under FCC rules
- Result: vacant spectrum is unavailable to fixed microwave.
Prior FWCC Request – 1

- In 1999 the FWCC requested:
  1. limit on earth station coordination to twice the spectrum actually needed
     • “actual need” construed broadly for teleports, etc.
  2. require an earth station to load to 50% within 30 months after licensing

- Satellite interests opposed

- In 2000 the FCC issued a Notice of Proposed Rulemaking:
  - earth stations would still coordinate full band and full arc
  - an earth station that denied coordination to a microwave applicant must show it was using or had imminent plans to use the spectrum
  - a microwave applicant denied coordination could take the dispute to the Commission.
Prior FWCC Request – 2

- FWCC opposed
  - expected frequent disputes at coordination time
    - could often delay start of microwave service
- Satellite interests also opposed
- In 2002, the FCC terminated the proceeding without action
  - added: “[W]e are open to new proposals or approaches … [We] do not foreclose the possibility that changes to our rules could improve the sharing environment and licensing processes for both … services.”
FWCC 2016 Request – 1

Proposal:
1. An earth station can coordinate only the specific combinations of frequency, azimuth, and elevation angle it intends to use
   - these are specified in the license
2. 12-month construction certificate includes a certification that licensed combinations of frequency, azimuth, and elevation angle are in operation
   - otherwise deleted from the license
3. If a combination of frequency, azimuth, and elevation angle goes unused for 90 days, must be reported to the Commission and be deleted from the license.
Proposal (continued):

4. An earth station can coordinate additional combinations of frequency, azimuth, and elevation angle as “growth capacity”
   • (partially analogous to fixed service growth channels)
   • growth capacity can be renewed indefinitely
   • earth station can apply to license growth capacity at any time
     – no further coordination needed

5. Fixed microwave can coordinate on growth capacity only as a last resort
   • and must consult with earth station on choice of channels

6. An earth station can request a waiver exempting it from all restrictions
   • for earth stations that must access multiple satellites or change satellites on short notice.
Policy Benefits of FWCC Proposal

- No wasted or warehoused spectrum
  - fixed microwave has access to vacant channels when needed
- Earth stations can earmark vacant spectrum they might need
  - fixed microwave must avoid if possible
- Waiver procedure accommodates earth stations with special needs
- More equitably balanced treatment of the two services.
Satellite Opposition to FWCC Proposal

- Vehement

- Categories of arguments:
  1. substantive, not well founded
  2. substantive
  3. procedural (also not well founded).
Satellite Opposition (1): Substantive, Not Well Founded

Arguments:

- No hard evidence that full-band, full-arc coordination ever blocks fixed microwave.
- Present rules overall favor fixed microwave over earth stations.
  - (Because 11 and 13 GHz earth stations are limited to international use)
- Full-band, full-arc coordination can’t be a problem because fixed microwave frequency coordination almost always succeeds.
  - Citing an FWCC statement on different issues in different bands.
- Fixed microwave voluntarily withdrew from 4 GHz.
- Fixed microwave applicants “prefer to expedite deployment by avoiding C-band.”
Satellite Opposition (2): Substantive

Arguments:

- short-term satellite services sometimes must set up on short notice
  - *e.g.*, transportables for political conventions or sporting events

- earth stations may have to quickly change satellites or frequencies due to:
  - in-orbit satellite failure
  - new interference
  - emergency or natural disaster requires new service
  - customers wanting to switch providers
    - promotes competition

- FWCC proposal would add to earth stations’ administrative burden and costs.
Transportables should qualify for waiver

On needing fast changes for satellite failure, interference, emergency or natural disaster, customers switching providers:

- fixed microwave also has equipment failures, interference, emergencies and natural disasters, and customers wanting to switch providers
- unfair for earth stations to reserve spectrum for these contingencies at the expense of fixed microwave
- FWCC proposal will spread the business risks of these events more equitably

Satellite companies’ complaint about administrative burden and cost is valid

- but fixed microwave bears those same costs
- no reason why earth stations should not also.
Satellite Opposition (3): Procedural, Not Well Founded

- An FCC rule allows dismissal of petitions that are “moot, premature, repetitive, frivolous, or which plainly do not warrant consideration by the Commission …”
  
  47 C.F.R. § 1.401(e)

- Satellite companies seek dismissal for repetitiveness (based on 1999 petition)
  - compare 2016 and 1999 petitions as being “similar,” “a rehash,” “substantially similar,” “nearly identical”

- No FCC precedent for:
  - dismissal of different requests, even if on same topic
  - dismissal for “repetitiveness” after seventeen years.
Present Status of Proceeding

- Last filings on January 24, 2017
- Now pending at FCC
- May be delayed by other proposals for 4 GHz
  - comments in 2016 full-band, full-arc proceeding suggested:
    - point-to-multipoint for last-mile broadband
    - terrestrial mobile.
Conclusions

- Full-band, full-arc coordination possibly made sense when adopted in 1960s
  - then, low demand for spectrum, plenty of room
- Now: shared bands have become congested
  - especially 4 and 6 GHz, the only fixed microwave bands for long links
- If satellite interests first proposed full-band, full-arc coordination today, FCC would not approve
  - but difficult to overcome a long-entrenched practice
  - decades of usage has given satellite interests a sense of entitlement
  - may be shared by the International Bureau.
Thank you!

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