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February 28, 2001

Via Hand Delivery

Magalie Roman Salas, Secretary
Federal Communications Commission
445 12th St., S.W., Room TW-B204
Washington, D.C. 20554

Re: Ex Parte File Nos. 48-SAT-P/LA-97, 89-SAT-AMEND-97, 130-SAT-AMEND-98, ET Docket No. 98-206

Dear Ms. Salas:

On February 28, 2001, Helene Fauve, Didier Casasoprana, Wassim Chourbaji, and Damien Garot, Senior Engineers, SkyBridge LLC, and Diane Gaylor, Esq., and the undersigned, of Paul, Weiss, Rifkind, Wharton & Garrison, met in person with Thomas Tycz, Cecily Holiday, Jennifer Gilsenan, Alex Roytblat, and Mark Young of the International Bureau, and discussed the attached materials.

If there are any questions regarding this matter, please contact the undersigned.

Respectfully submitted,

Jeffrey H. Olson
Attorney for SkyBridge L.P.

Enclosure

cc: Thomas Tycz
Cecily Holiday
Jennifer Gilsenan
Alex Roytblat
Mark Young
International Bureau

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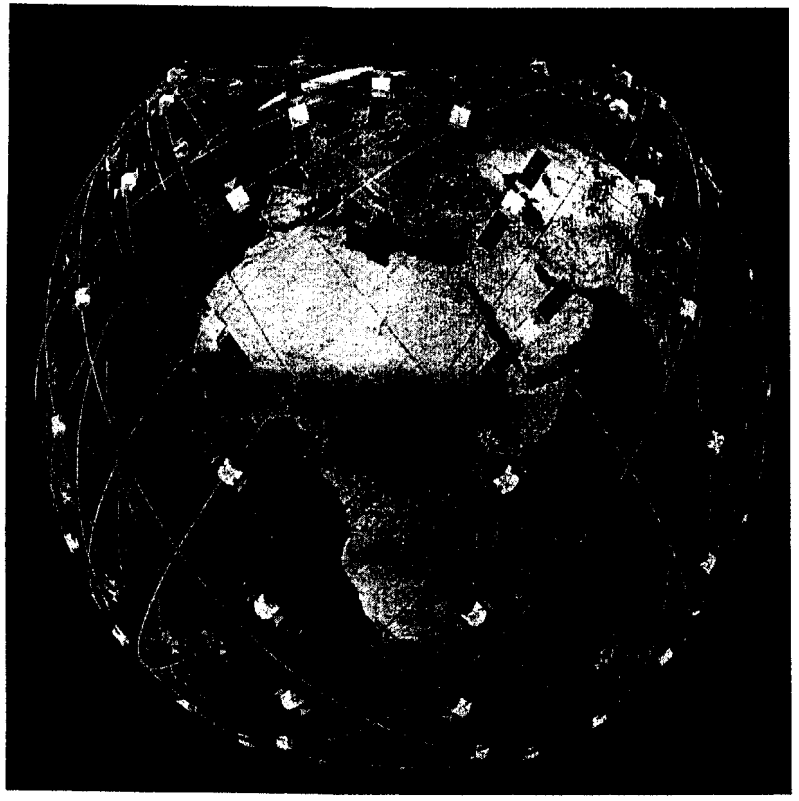

NGSO/NGSO Sharing

Washington D.C., February 28 2001

SkyBridge L.P.

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NGSO/NGSO sharing: options that have been proposed

1. Band Segmentation between all Applicants (7)

2. Flexible Band Segmentation

- ✓ The band is divided among the operational systems
- ✓ The amount of frequency available decreases with number of systems

3. Homogeneous orbits

4. VGSO exclusive band (same as Option 1 with advantage granted to HEOs)

5. The Home Zone (SkyBridge proposal)

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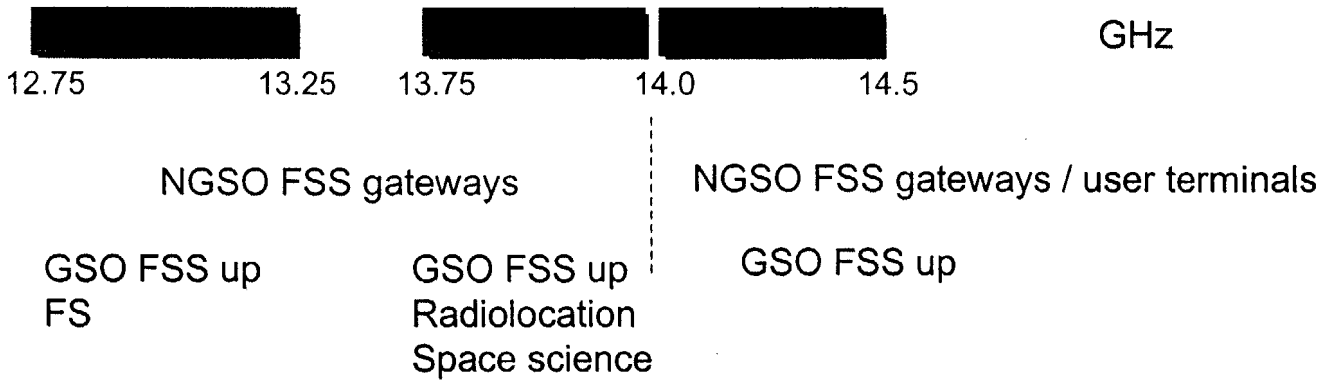
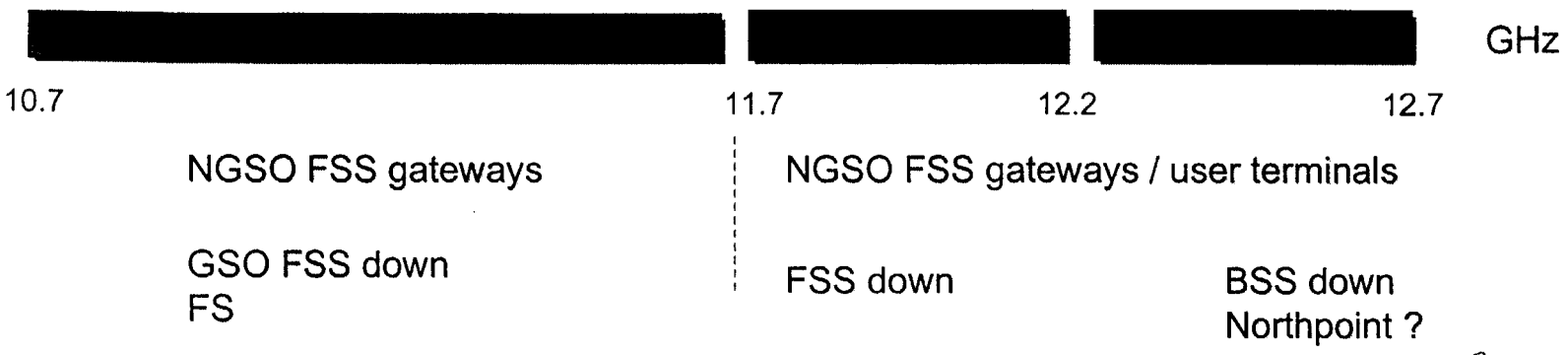
Different status of the different bands

NGSO FSS up-link bands



NGSO FSS down-link bands



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Solution for non-fungible bands

Whatever final solution is adopted by FCC, it should provide each NGSO system access to bands with same sharing conditions:

10.7-11.7 GHz, 11.7-12.2 GHz, 12.2-12.7 Ghz downlink;

12.75-13.25 GHz, 13.75-14 GHz, 14-14.5 Ghz uplink

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Option 1

Band Segmentation between all Applicants (7)

- ***Least optimal for all operating systems***
- ***Most sensitive to paper satellites***
  - ✓ Will freeze some frequency bands never used by operating NGSO systems
- ***Split bandwidth increases price of satellites.***
  - ✓ Need for individual transponder for each piece of spectrum.

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Option 2

Flexible Band Segmentation : The band is divided among operational systems only

- ***High risk for operational systems***
  - ✓ either accept a very small amount of spectrum incompatible with broadband operations
  - ✓ or accept risk of seeing bandwidth and capacity decrease with arrival of new systems
- ***Major difficulty to convince investor of viability of business case***
- ***Same problem with split bandwidth as in option 1:***
  - ✓ need for individual transponder for each piece of spectrum.

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Option 3

Homogeneous Orbits

- ***Need to select a standard orbit and to convince all NGSO systems to abandon their system design for a new constellation***
  - ✓ Major patents issue. One system will have a strong leading position controlling new entries by price of IPR
  - ✓ Each kind of orbit has its own advantages and drawbacks
- ***What about international systems not serving USA?***
  - ✓ Difficult to impose band planning on global systems on a national basis

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Option 4

VGSO exclusive band

- ***Each Orbit has its own drawbacks and advantages***

- ***Each constellation, if provided an exclusive spectrum, would be in a position to optimize their operation***
  - ✓ However, this is not an OPTIMAL overall solution

- ***Frequency sharing always has a price; LEO and MEO systems will have to modify their system and lose capacity to share amongst themselves***

- ***Some HEO applicants have already expressed their willingness to cooperate. Sharing among VGSO and other orbit systems is possible but requires good will***

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Option 4

VGSO exclusive band

- ***Virgo claims up to 28 identical systems operating co-frequency***
  - ✓ but their application states that Virgo holds all IPR relative to orbits and constellation
  - ✓ Granting an exclusive band to VGSO will permit them to control new entries in their exclusive spectrum through IPR price

- ***Different from the Big LEO case. BIG LEOs faced a technical impossibility. For VGSOs, sharing solutions exist.***

- ***Making cost reduction the principal design consideration renders sharing impossible. Such an approach is not compatible with the spectrum congestion facing operators.***

- ***Accepting some burden makes sharing possible while increasing moderately the complexity of ALL concerned systems.***

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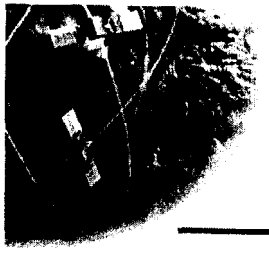

The "Home Zone" Approach

- ✓ The home zone of a NGSO satellite is a contour around a satellite as seen from the ground
- ✓ In the home zone, the spectrum is segmented between the NGSO systems
- ✓ Outside the zone, the whole spectrum is available

This simple default scenario permits operators to:

- ✓ Optimize spectrum resources
- ✓ Maximize each system's capacity
- ✓ Guarantee equal access to spectrum for each of the seven systems
- ✓ Create incentives for coordination

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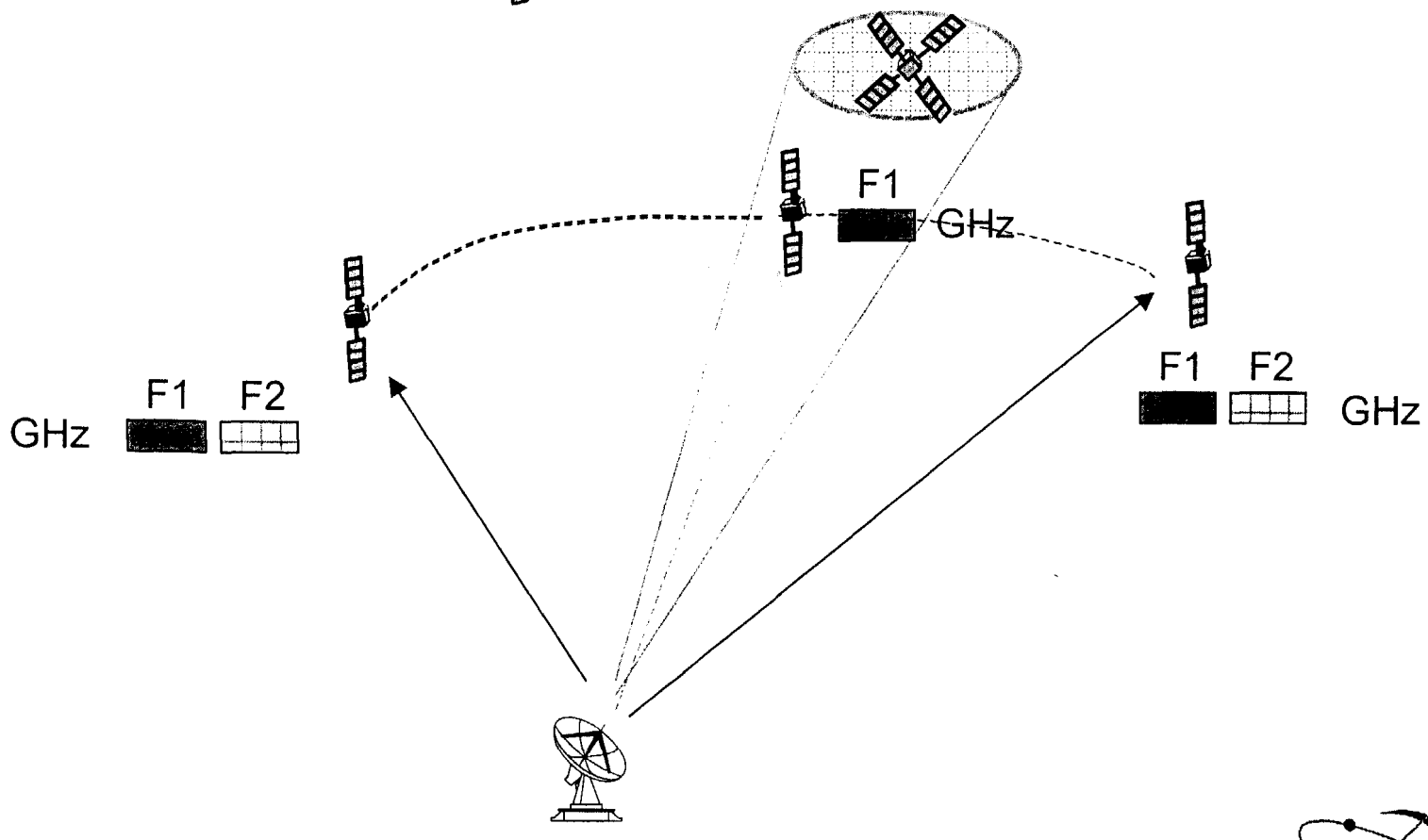
Home Zone
Dynamical example with 2 systems

Spectrum available for system:



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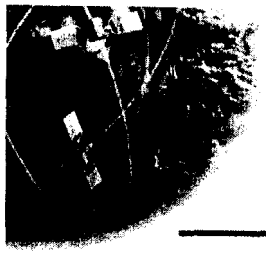

The Home Zone Approach

Some elements of the Home Zone approach remain to be defined during the NPRM:

- ✓ Spectrum arrangements in the case of Home Zone events
- ✓ Angular aperture of the Home Zone
- ✓ Specific dispositions (power discrepancies)
- ✓ Case of more than 2 systems involved in a Home Zone event
- ✓ Use of mitigation techniques for NGSO to optimize spectrum

However, the existing elements of the proposal provide sufficient confidence that the NPRM will succeed

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The Home Zone Approach
Spectrum arrangements

The bands available to NGSO systems are not fungible

Some systems may have some preferences on which part of spectrum to operate

- ✓ At least, 1 system (Virgo) already made clear where it would prefer to operate in a Home Zone case involving 2 systems

The most harmonious way to split spectrum in HZ events

- ✓ can involve consultations among the applicants on their preferences
- ✓ Can be based on a balanced burden sharing easily defined over the number of HZ events

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The Home Zone Approach
The aperture issue

The Home Zone approach has several objectives:

- ✓ Allow systems to coordinate in case of coordination failure
  - ⇒ Need to protect the systems
- ✓ Provides an incentive for coordination
  - ⇒ Forces the systems to look for a more suitable solution

Different values of the aperture of the HZ will be proposed

- ✓ Each applicant will have its own specific idea of the suitable protection from the HZ.
- ✓ The FCC should select ONE value that achieves a proper balance.

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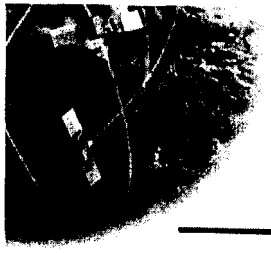

The Home Zone Approach
The power discrepancies

Most of the systems have similar power levels

Where there is a discrepancy, a solution is to increase the aperture of the HZ for those systems

- ✓ The impact is on both systems
- ✓ The more powerful system is more penalized

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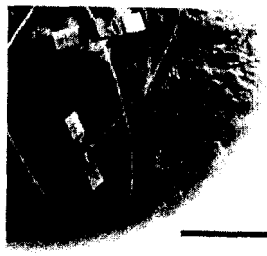

The Home Zone Approach
Case with more than 2 systems

The Home Zone concept has an impact only during limited times (corresponding to HZ events)

- ✓ For 2 systems, ~Y% of the time
- ✓ For 3 systems , ~X% of the time
- ✓ For 4 systems, ~Z% of the time
- ✓ there are no HZ event involving more than 4 systems

Spectrum arrangements can be crafted in the same way as in the bilateral case

- ✓ Definition based on the preferences of the applicants
- ✓ Orbitography can easily compute HZ events: a balanced spectrum arrangement can be deployed thanks to that repetitiveness

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The Home Zone Approach
Use of mitigation techniques

Operational mitigation techniques can offer NGSO systems ways to limit the impact of the Home Zone approach

- ✓ A system with satellite diversity can employ the whole spectrum all the time
  - Circular orbits systems should be able to use such capability
  - HEO applicants may also be able to employ satellite diversity

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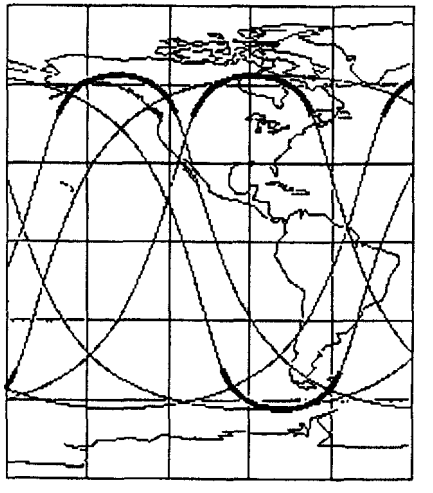
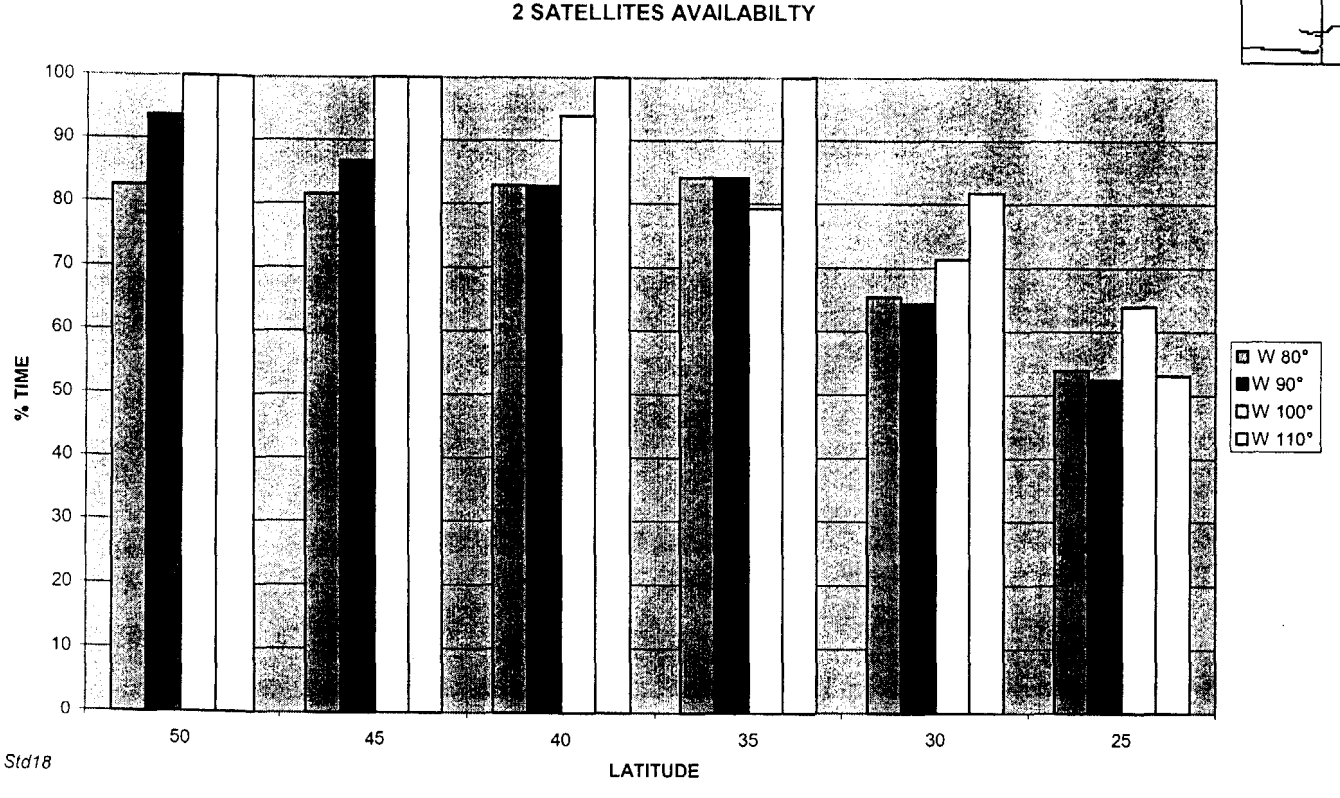
The Home Zone Approach
The Virgo example

Tracking strategies :

- ✓ At least 40° from the GSO arc
- ✓ Elevation higher than 40°





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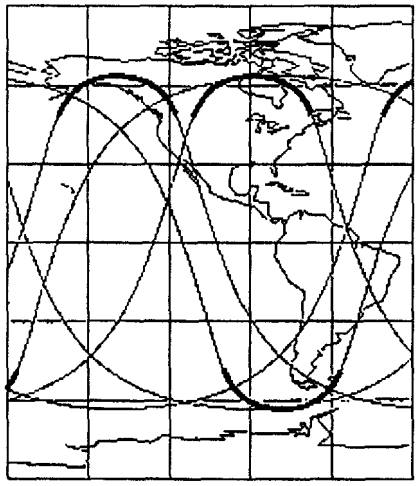
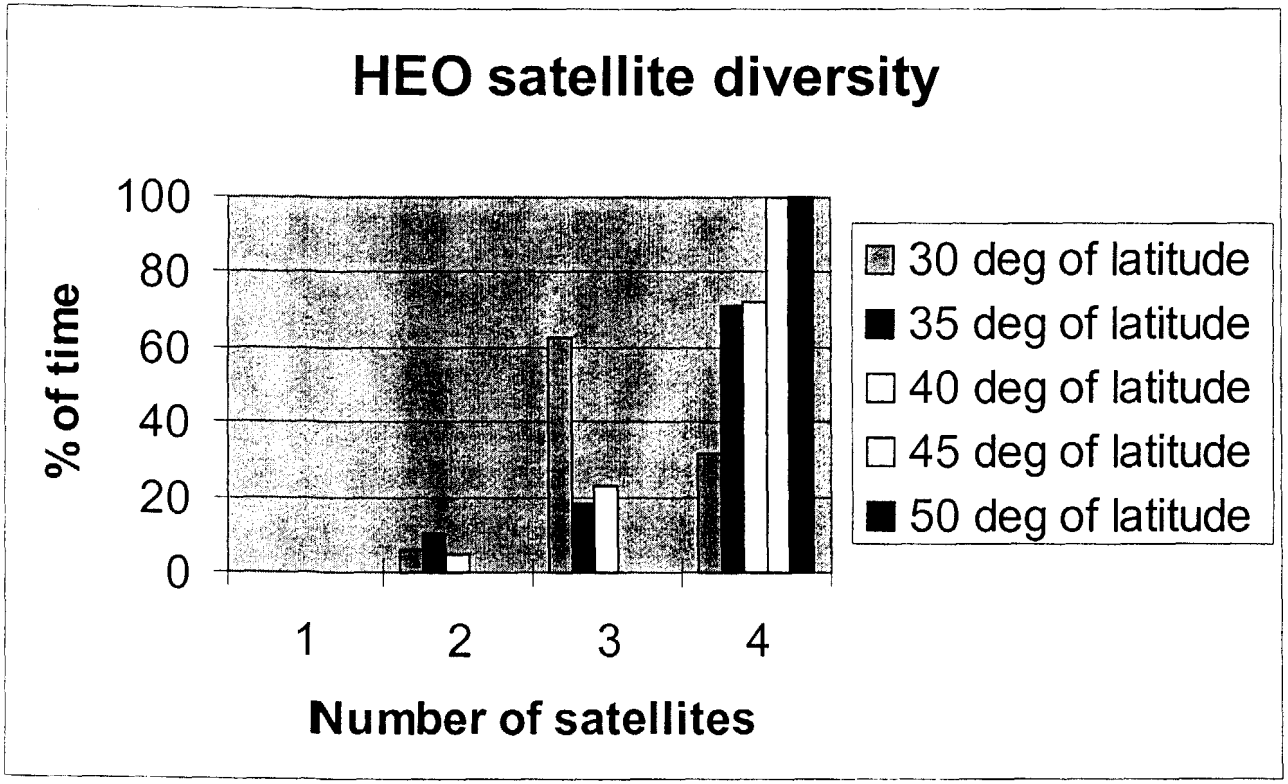
The Home Zone Approach
The Virgo example



Tracking strategies :

- ✓ At least 40° from the GSO arc
- ✓ Elevation higher than 10°



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The Home Zone Approach
Conclusion

The Home Zone approach allows NGSO systems to co-exist even without coordination while optimizing the spectrum use

It also avoids the need for FCC to micro-manage the default scenario issue

It is an incentive for NGSO systems to coordinate

It permits NGSO systems with built-in flexibility to optimize their capacity

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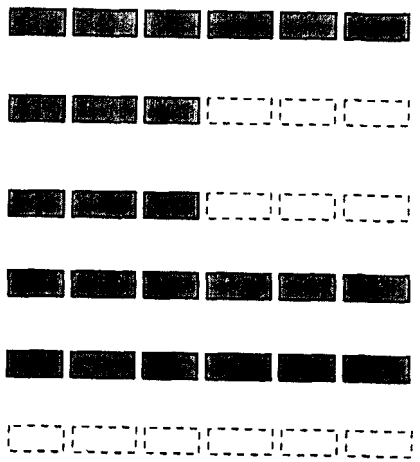
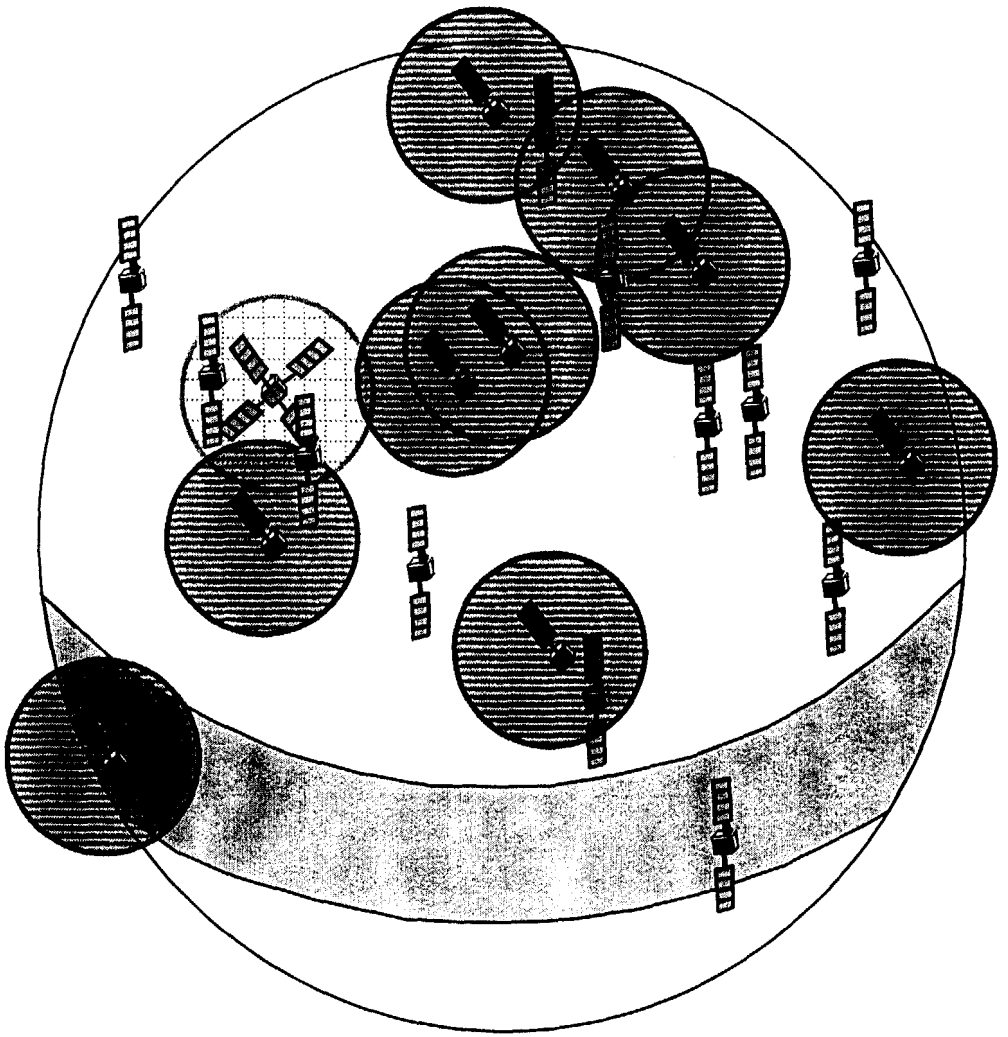
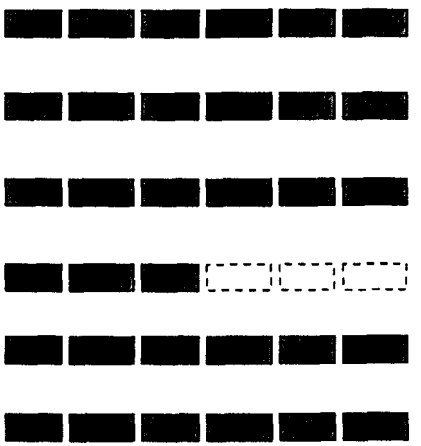
Home Zone
Example with 3 systems

GHz





GHz



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