Iridium NEXT & Radio Astronomy

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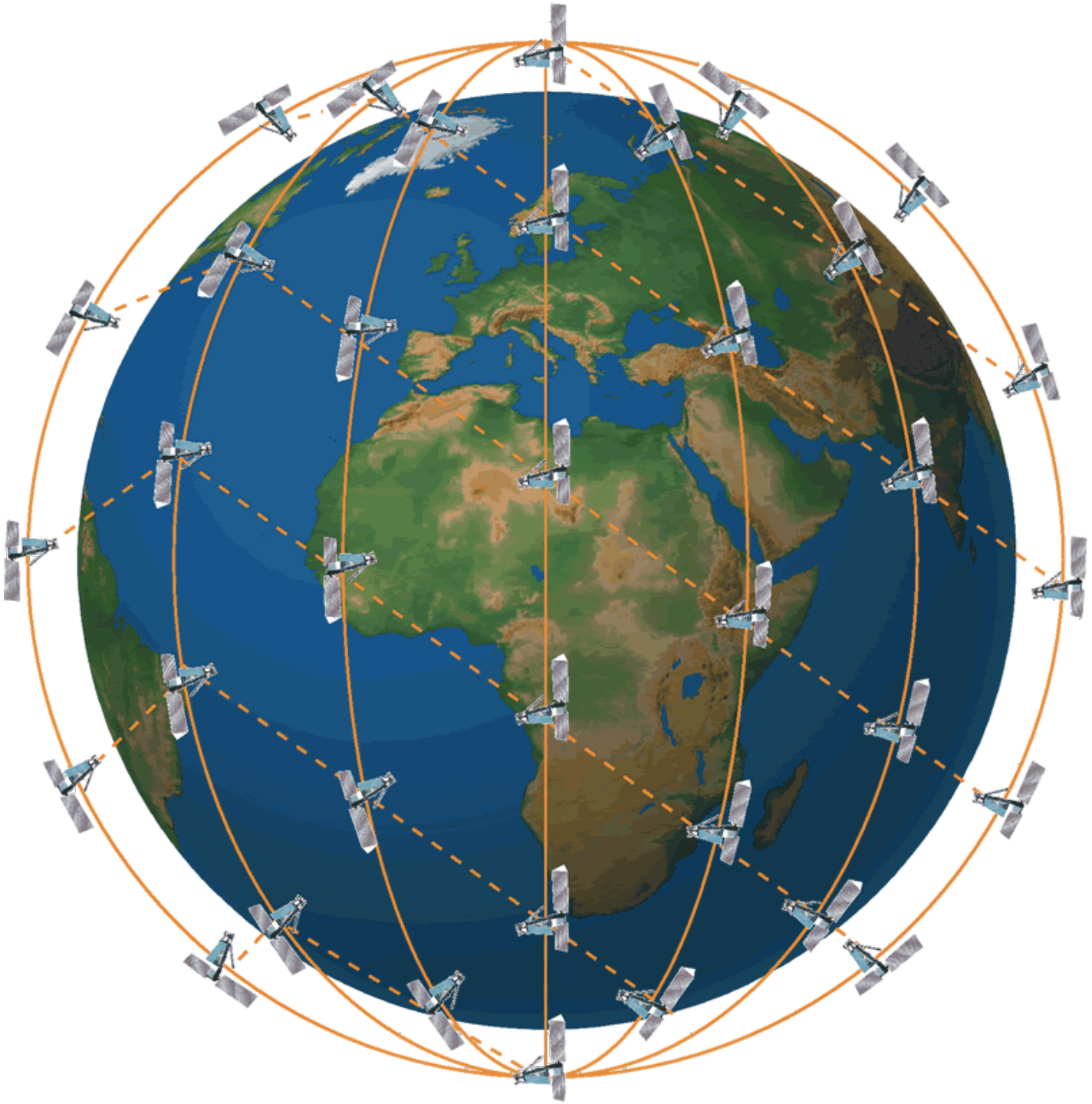
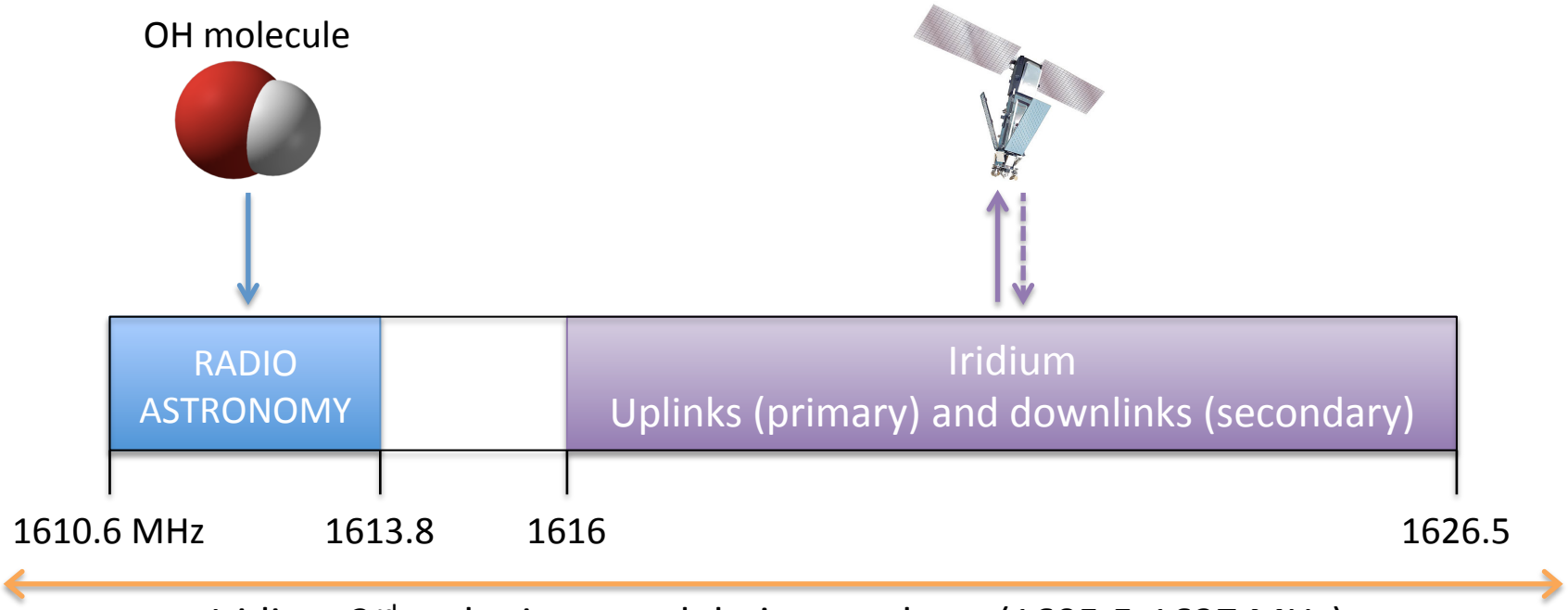


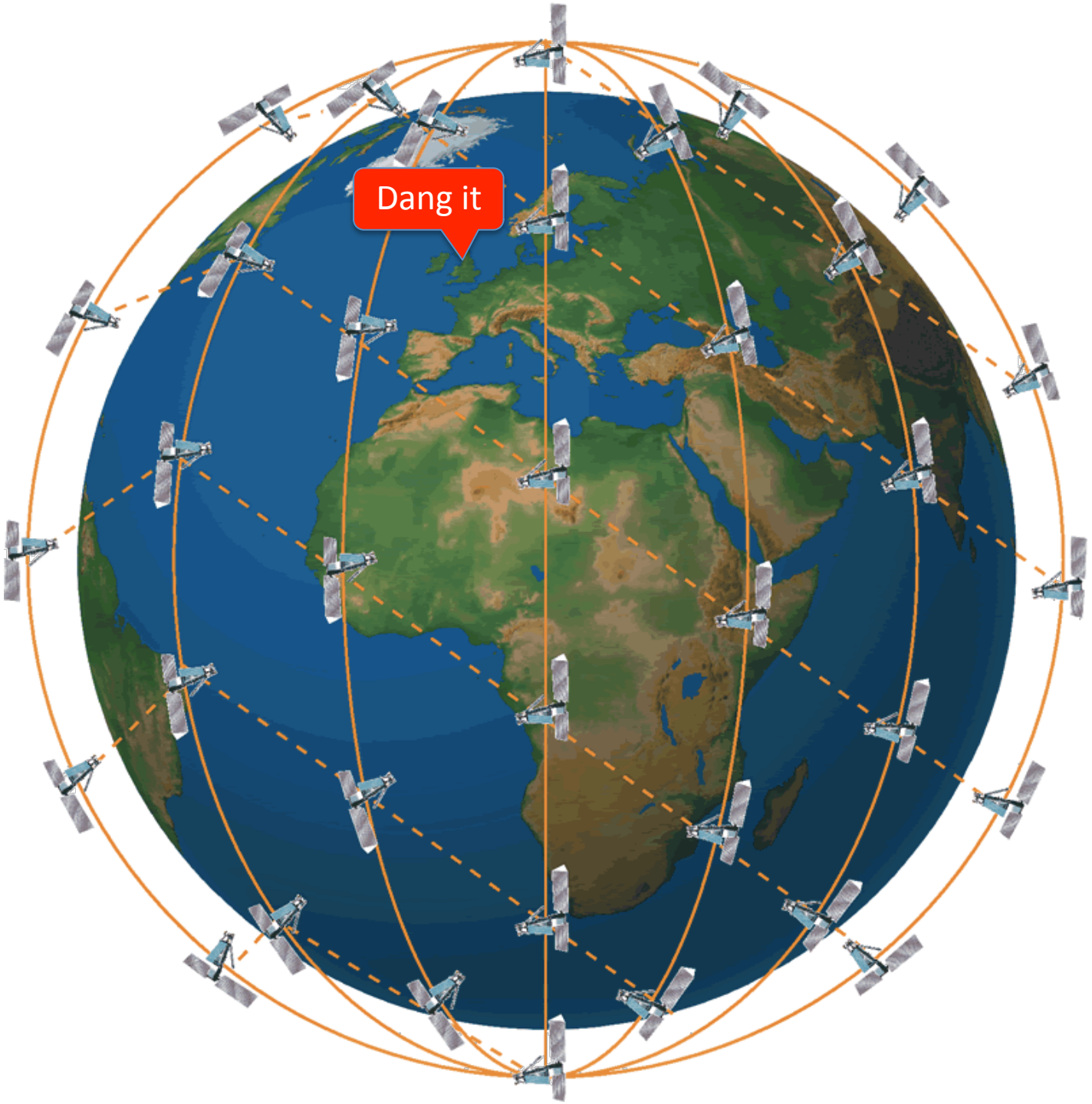
Iridium Traffic Pattern

Iridium traffic pattern (not including U.S. military), 2007

Iridium & RAS Allocation



Current Iridium satellites generate significant intermodulation products, which cause interference into the radio astronomy band


Dang it

Iridium NEXT

- Next generation of Iridium space vehicles with several improvements
- Improvements include a “RASP” mode that can be switched on as needed to reduce interference into the radio astronomy allocation

Iridium NEXT RFI Mitigation Capabilities

- Restrict transmission of signal channels to the upper part of the Iridium band to move transmitted IMs away from RA band
- Reduce EIRP of the high EIRP bursts, i.e. Broadcast bursts
- Back-off carrier power of all transmitted signals in the beams when IM threshold is reached
- Use higher power bias for antenna power amplifiers to improve linearity (and decrease IM product power levels)
- SAW filters to reduce OOBE below 1616 MHz
- Some of these methods may result in reduction of supported traffic in spot beam

Characteristics of Iridium NEXT

- Designed to function down to 1616 MHz
  - Present generation operates to 1617.775
  - License request into FCC to extend down to 1616
  - Will be hardware-filtered below 1616 MHz
- Several hardware and operational capabilities that can be implemented to reduce RFI
  - Implementable in a worldwide 2 deg x 2 deg grid with 30 sec time steps
  - Would protect specific observatories at specific times
  - Can meet Rec 769 objectives when RFI reduction mode is active
- Spacecraft are continuously updated with 3-days of operating data to allow them to “flywheel” through any control outages

Characteristics of Iridium NEXT

- Hardware design is fixed; satellites are in low-rate production mode (as of mid-2013)
- The first two NEXT satellites will launch from Russia in February 2015
  - After that, satellites will launch ten at a time beginning in July 2015
- After launch, Iridium is interested in working through facilities such as Leeheim and Stanford to verify compliance with Rec 769

Coordination and Implementation

- Iridium asks that we provide observing schedules on three-day notice for them to implement RFI reduction for specified observatories
- Iridium has begun to design a Web interface for RA observation notification
  - Would prefer to migrate to a simple M2M interface for automated notifications
  - Should be simple to extend functionality of dynamic scheduling software to implement automated notifications
- Similar to suggested methodology for TV white spaces, and probably useful for 14 GHz too

Summary

- Iridium has implemented several hardware and operational features in its next-generation constellation that should allow for protection of RA at the Rec 769 level *when needed*

Downside of Iridium NEXT

No more Iridium flares