



**N G S O**

threat ?

# c o n t e x t

PT Sarana Mukti Adijaya is an Indonesian GSO Operator

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And more...

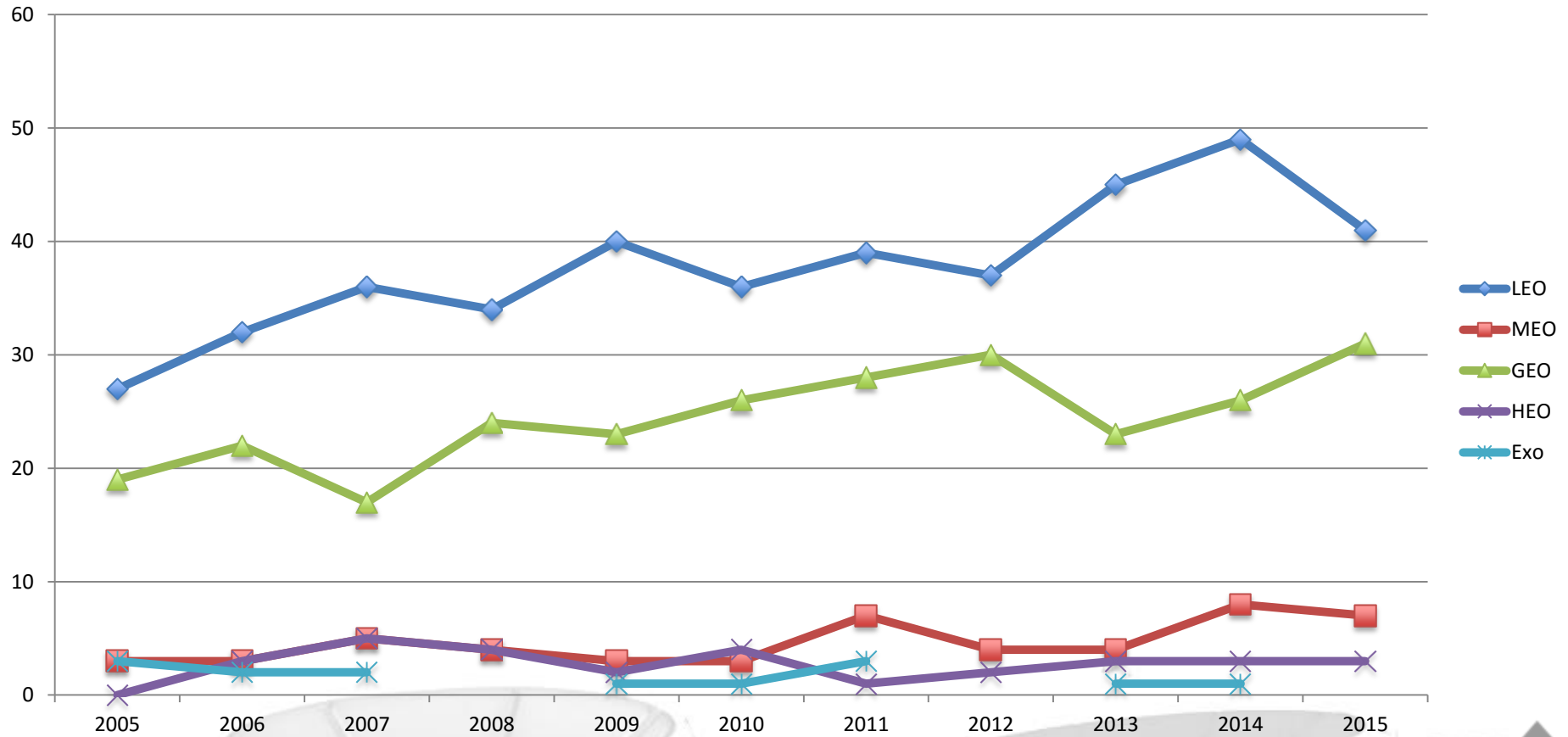


# r e c a p

	leo	meo	geo	heo
altitude	160 – 2000 km	2000 – 35786 km	35786 km	> 35786 km
period	Up to 40 minutes	2 – 8 hours	24 hours	> 24 hours
latency	10ms	Up to 150 ms	Up to 280 ms	Beyond 280 ms
Satellites / constellation	40 - 80	8 - 20	3 - 4	
Gateway complexity	Very	medium	simple	simple



# l a u n c h e s



# G S O Belt

Is Crowded  
and more coming every day



A world map with a grid overlay. A red horizontal line with small diamond markers is drawn across the equator, representing the Geostationary Orbit (GSO) Belt. The map shows the continents and oceans, with the red line passing through the center of the Earth.

80 -150 -120 -90 -60 -30 0 30 60 90 120 150 180

Getting frequency and keeping it is not  
easy



SMA

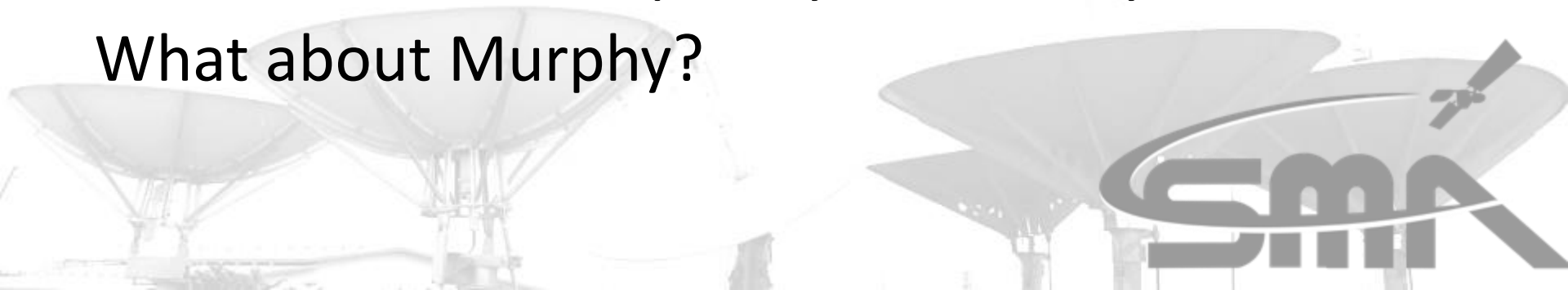
The SMA logo is located in the bottom right corner of the image. It consists of the letters 'SMA' in a bold, sans-serif font, with a stylized satellite dish or orbital path graphic behind the letters.

# W h y ?

- As GSO becomes more crowded  
NGSO becomes more attractive
- Cheaper launch
- Cheaper satellites
- Lower latency

But what about frequency availability?

What about Murphy?

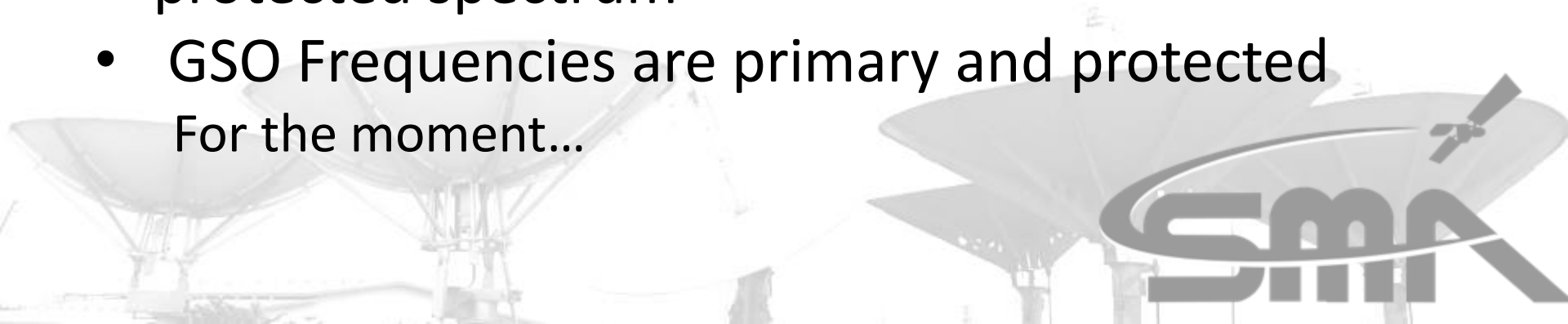


# ITU RR

- Currently NGSO are assigned by ITU RR

**5.209** The use of the bands 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 454- 456 MHz and 459-460 MHz by the mobile-satellite service is limited to non-geostationary-satellite systems. (WRC-97)

- There are several RR's that regulate NGSO
  - Power: 22.2, 22.3, 22.4, 22.5
  - Direction of transmission: 9.2
  - Use of frequencies: 5.209, 5.392, 11, etc...
- WRC 19 Agenda Item 1.6 ,1.7, 9.1.3 seek for more protected spectrum
- GSO Frequencies are primary and protected  
For the moment...



# u n c h a r t e d t e r r i t o r y

Future coordination methods and calculations  
between GSO and NGSO

Eclipsing of GSO satellites by NGSO  
as NGSO increase

Interference by NGSO Satellites to GSO terminals/ Earth  
Stations

Interference by NGSO Earth Stations to GSO satellites

Increased noise floor due to increased RF activity

These are just some of the things we need to work on in  
the near future.

