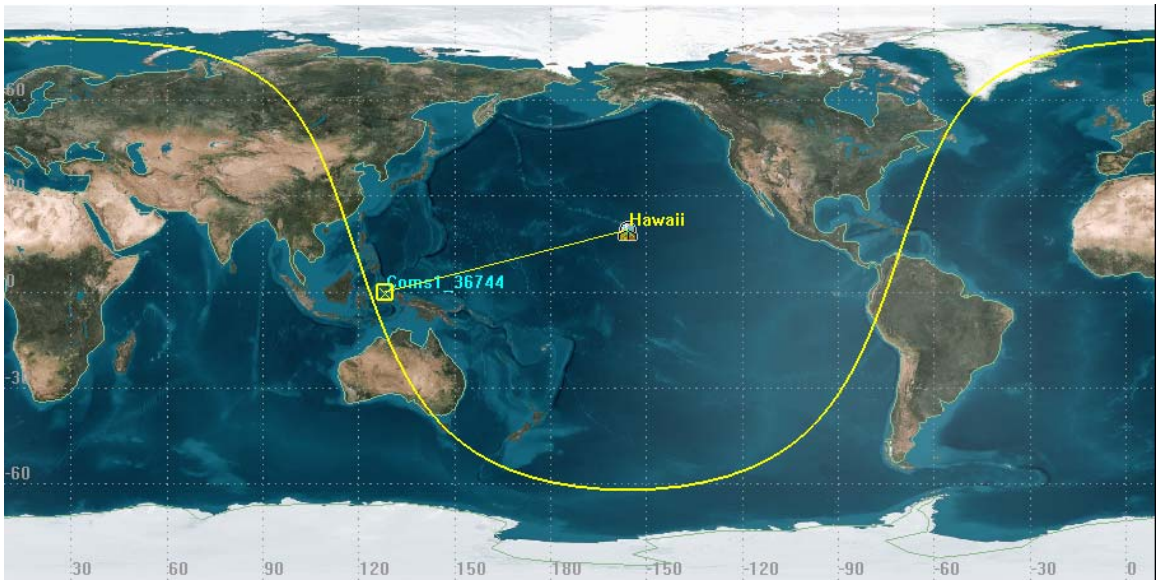
Test qualification support for the KARI GK-2A LEOP using the KARI COMS-1 spacecraft from USN's Hawaii ground station

KARI (Korean Aerospace Research Institute) in South Korea will launch 2 geosynchronous spacecraft (GK-2A and GK-2B) in late 2018 and early 2019 for communications and meteorology support. USN will support both launches in the LEOP phase to final orbit parking. KARI desires some tracking qualification testing before the missions launch. KARI has requested that USN conduct a tracking and telemetry campaign using their on orbit COMS-1 spacecraft. This test will consist of a maximum of 2 days the week of June 18th 2018.

The COMS-1 spacecraft is parked at 128.2 degrees east. USN will conduct receive only tracking and telemetry on 2271.6 MHz.



COMS-1 view from Hawaii

The spacecraft is always in view of the USN Hawaii ground station with tracking elevation of 4.6 degrees and azimuth of 265.2 degrees.

Flux Density impinging on the ground in Hawaii from COMS-1

The Flux density is calculated as:

$$\boldsymbol{Flux\ density = EIRP \div (4\,\pi\, Rse^2)}$$

Where $\boldsymbol{Rse}$ is the distance from spacecraft to the ground?
Where $\boldsymbol{EIRP}$ is the Effective Isotropic Radiated Power of the spacecraft?

Data from the spacecraft vendor indicates that the nominal EIRP of COMS-1 spacecraft is -4.0 dBW. Being a geosynchronous satellite parked at 128.2 degrees east the slant range to USN Hawaii is = 41,177 Km.

Converting -4.0 dBW to scalar watts = 0.398 watts transmitted at 2271.6 MHz

Therefor:

$$\boldsymbol{Flux\ density = 0.398 \div (4\,\pi * 41,117,000\ meters^2)}$$

Flux density = 1.873 x 10^{-17} Watts/meter^2
Or
Flux density = 1.873 x 10^{-18} mW/cm^2