

INFORMATION BRIEF

March 27, 2019

TOPIC: Operational impacts from potential loss of NOAA/NASA METOC satellite data resulting from the FCC spectrum auction for 5G

EXECUTIVE SUMMARY:

- Remotely sensed observations (water vapor) may be degraded or lost due to growing interference from the broader adoption of 5G; specifically, in the 24 GHz bands.
- Naval operations will continue but with a probable degradation of weather and ocean models, resulting in increased risk in Safety of Flight and Safety of Navigation, and degraded Battlespace Awareness for tactical / operational advantage.

BACKGROUND:

- DON does not own or maintain any organic Space Based Environmental Monitoring (SBEM) capabilities that will be impacted by the expanded use of 5G in the 24+ GHz ranges; however, Navy and Marine Corps are reliant on data received from NOAA and NASA SBEM (and foreign partners) for analysis and prediction of critical parameters.
- Remote sensing in the 23.6-24 GHz band is used to determine water vapor and due to the physical properties of the atmosphere, is the only frequency band for this measurement. Accurate water vapor measurements are vital for determining total water content – which is required to derive tangible parameters of snow, ice, rain, and wave height, and for use in meteorological and oceanographic models (waves, surface currents, and acoustics).
- The Federal Communications Commission (FCC) began a spectrum auction on March 14, 2019 to support 5G, specifically from 24.25-24.45 GHz and 24.75-25.25 GHz. The FCC has allowed for a bleed-over of -20dB (standard tolerance per FCC guidelines).

ISSUE/PROBLEM:

- NOAA and NASA have conducted studies that show interference in passive collection at the 23.6-24 GHz band from the adjacent 5G band (24.25 GHz); as such it is expected that interference will result in a partial-to-complete loss of remotely sensed water-vapor measurements. It is also expected that impacts will be concentrated in urban areas of the United States first.
- An additional assumption is that if the U.S. expands into the 24 GHz band, other countries will follow suit and thus impacts will eventually be worldwide, concentrated near densely-populated areas.
- Direct and derived impacts to Navy and Marine Corps Meteorology and Oceanography include:
 - Precipitation (rain, ice, snow; rate and total amount)
 - Sea-surface height, wave and surface current forecasts, acoustic models
 - Ice observations (ice edge and concentration)
 - Tropical Cyclone analysis, development, trajectory, positioning and intensity
- Direct and derived impacts to Navy and Marine Corps operations include:
 - Degraded Safety of Flight and Safety of Navigation forecasts
 - Degraded Battlespace Awareness for tactical / operational advantage

COURSES OF ACTION:

- COA 1: Request FCC tighten out-of-band interference by reducing bleed-over limits to -57dB.
- COA 2: As 5G testing and fielding occurs, work with NOAA and NASA to continually assess and quantify actual impacts, and work to develop mitigations within the Federal Weather Enterprise. This includes but is not limited use of other channels, substitution of lesser fidelity parameters, and the development of new techniques and algorithms through new research and development.