

STARLINK

04.27.20

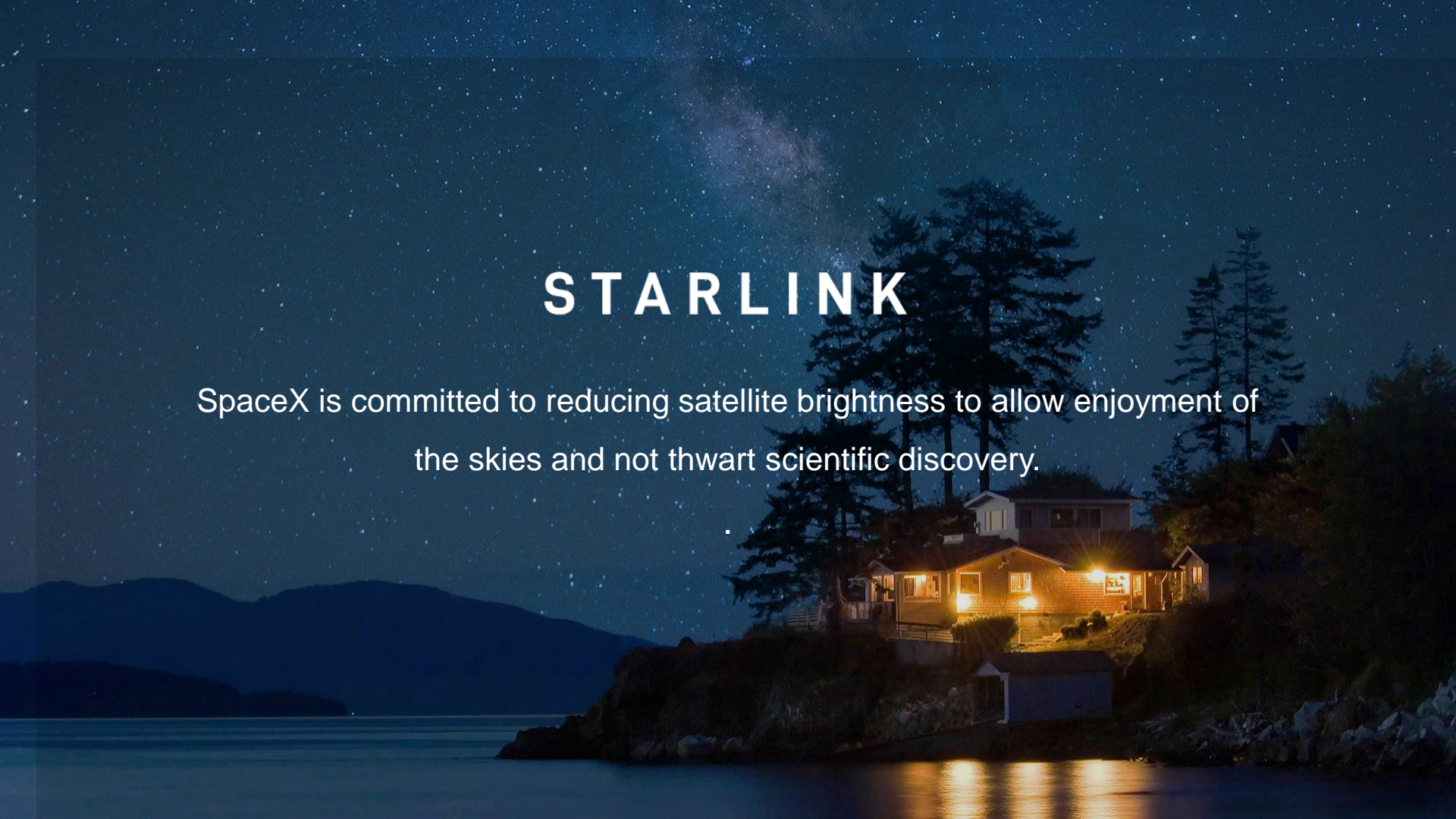
STARLINK: NAS DECADAL PANEL

Starlink will provide high speed, low-latency broadband connectivity across the globe, including to locations where traditionally internet has been too expensive, unreliable, or entirely unavailable.



STARLINK

SpaceX is committed to reducing satellite brightness to allow enjoyment of the skies and not thwart scientific discovery.



OBJECTIVES

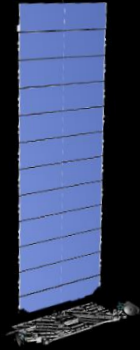
Make the satellites generally invisible to the naked eye
within a week of launch.

Minimize Starlink's impact on astronomy by darkening satellites so they do not
saturate observatory detectors.



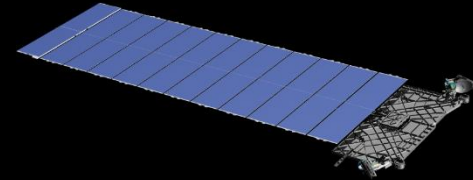
SATELLITE OVERVIEW

On station, brightness is driven by antennas since the satellite is in the "shark-fin" configuration during sunset and sunrise.



SHARK-FIN

During orbit raise, brightness is driven by the "open book" configuration for thrusting and drag and sunlight reflects off both the antenna and array.



OPEN BOOK

KEY SOLUTIONS

ON STATION: Reduce reflection on antennas during sunset and sunrise

ORBIT RAISE: Change orientation to reduce reflection off both the antenna and array

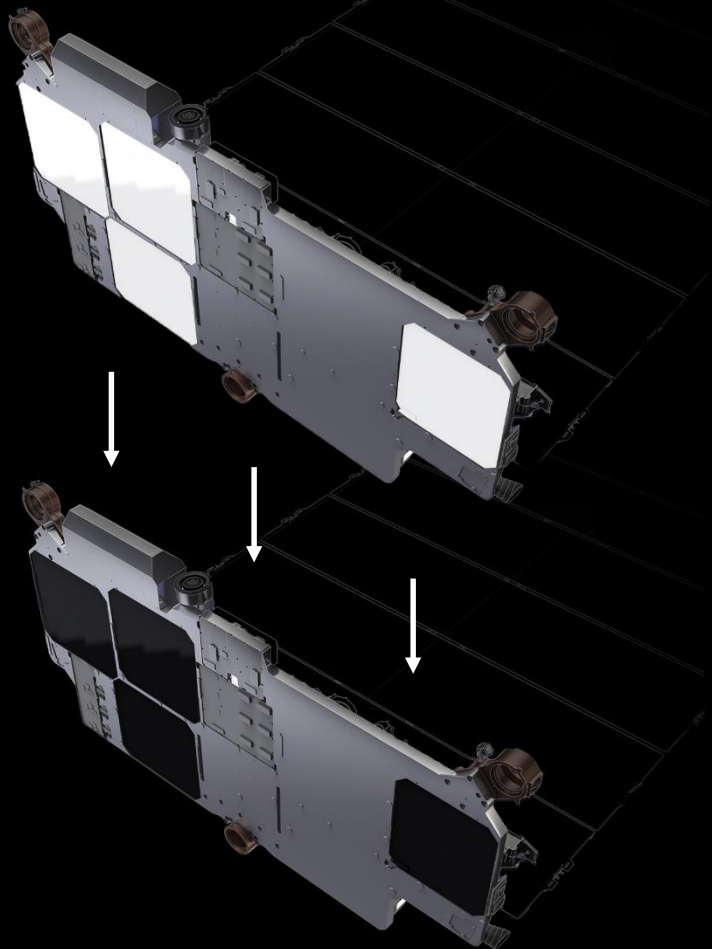
As the v1.0 constellation grows, the number of satellites on station will grow,
but the number of satellites orbit raising will stay similar to what it is today.



DARKSAT

ANTENNAE MITIGATION ON STATION

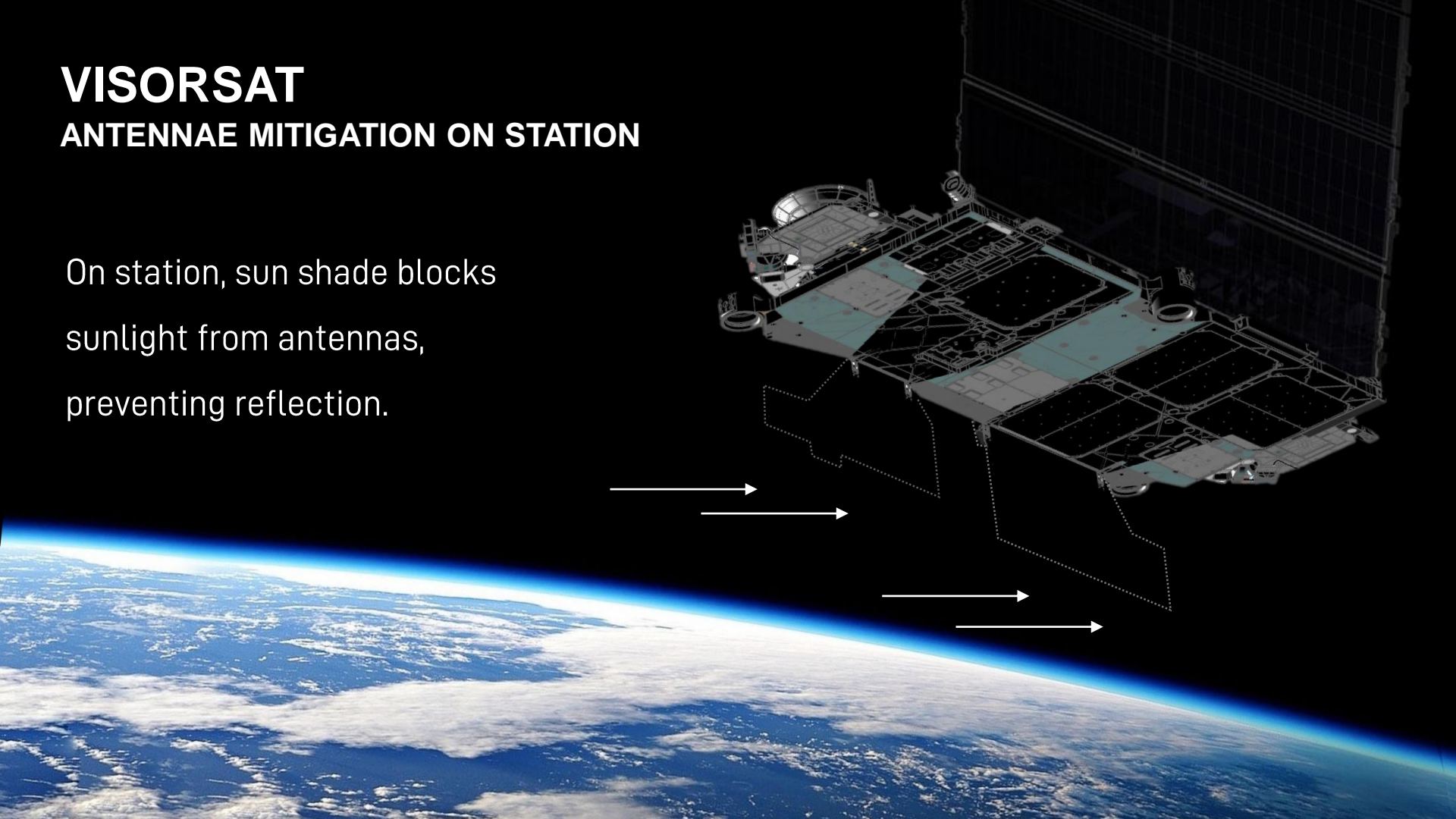
Ground-based observations of our initial test experiment proved we can significantly reduce brightness. Subsequently, we developed a higher-performance option.



VISORSAT

ANTENNAE MITIGATION ON STATION

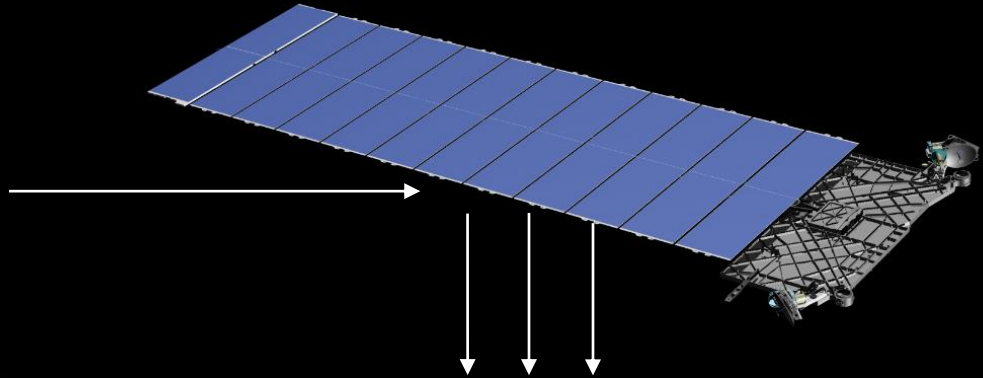
On station, sun shade blocks sunlight from antennas, preventing reflection.



ORIENTATIONAL ROLL

ANTENNAE MITIGATION DURING ORBIT RAISE

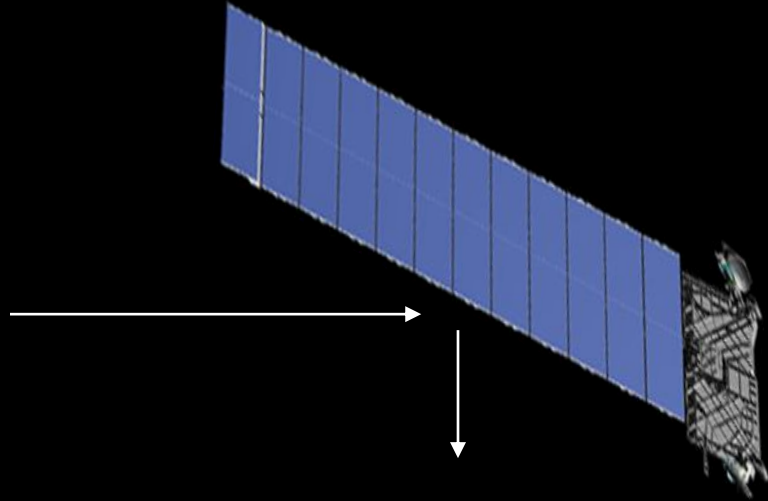
At sunrise, sunlight reflects off back of array, making the satellite more visible from the ground.



ORIENTATIONAL ROLL

ARRAY MITIGATION DURING ORBIT RAISE

Rolling satellite makes sunlight bounce off smaller 'knife edge' of array, reducing reflection.





QUESTIONS