# LINEVISION SATELLITE COMMUNICATIONS

## OUR TEAM

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LINEVISION

## ABOUT LINEVISION:

LineVision's patented contactless LiDAR scanning procedure equips transmission providers with a **Dynamic Line Rating (DLR)** to optimize the power transmission efficiency of their power lines. Together, LineVision and their partners, are working to make the future of the power grid clean, renewable, and resilient.

LineVision's current product, the LUX, is a contactless monitoring system that is mounted at the base of a transmission tower. It intakes a 3D sensor scan of the power line for LineVision's algorithm to analyze.

The LUX uses cellular communications to send this the data. This type of coverage can be limited in rural or socio-economically disadvantaged areas, but with the expanding market of broadband access through low bandwidth commercial satellites, there is an opportunity to service these difficult to reach locations.

*Our Goal:*

# IMPLEMENT LOW BANDWIDTH SATELLITE CONNECTIVITY ON THE LUX

## DYNAMIC LINE RATING (DLR):

The DLR is a single metric that quantifies how much power can safely be drawn through the line. It is quantified using several inputs, including sag and blowout.

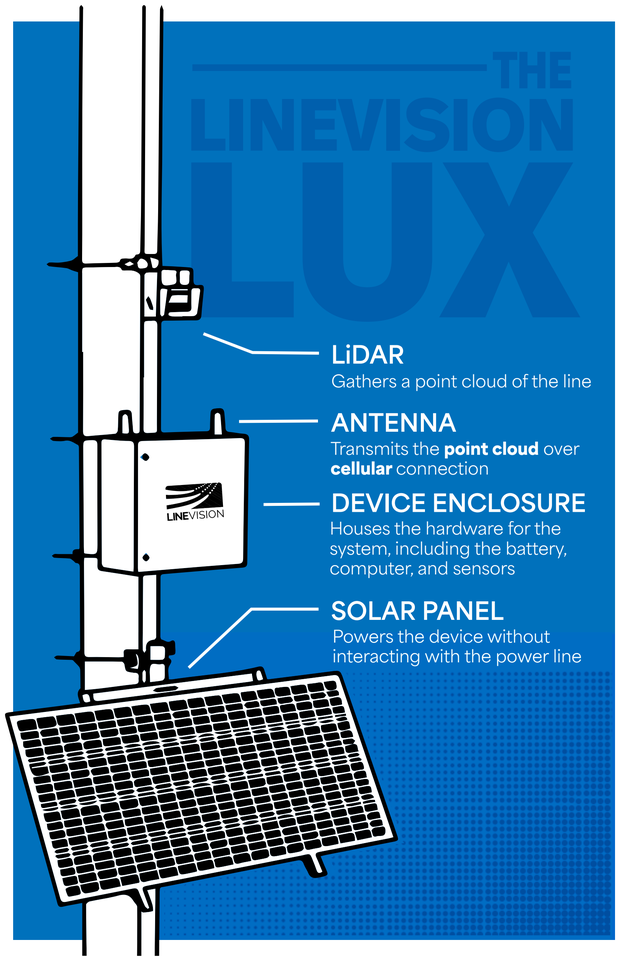
## SAG:

The sag metric captures the impact of temperature on the length of the power line. As the line heats up, it expands, causing the line to hang lower.

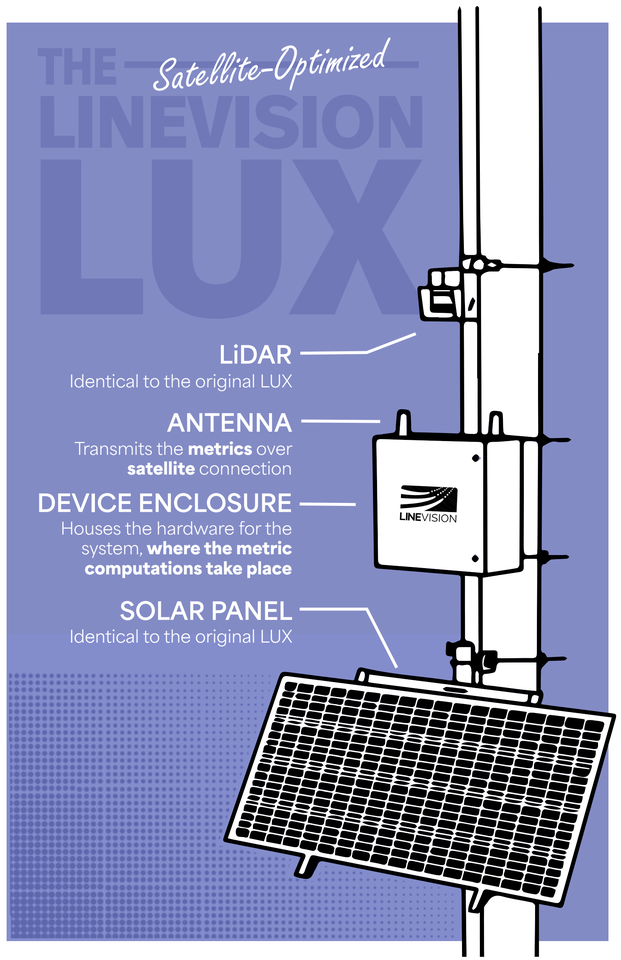
## BLOWOUT:

The blowout metric defines the motion of the power line as it sways in the wind.

## THE LINEVISION LUX

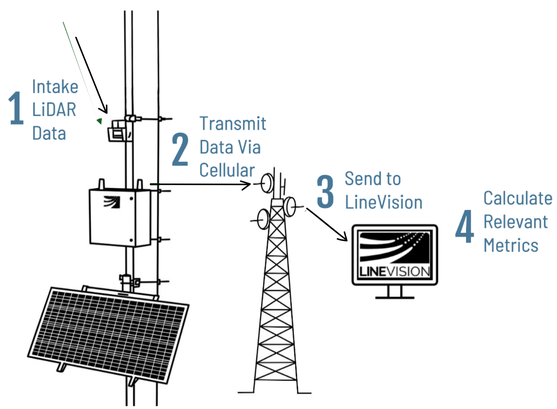



## THE *Satellite-Optimized* LINEVISION LUX



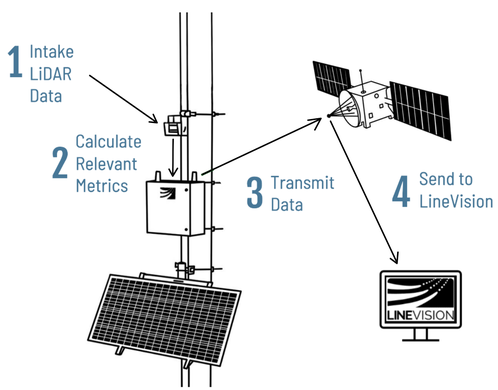

## CELLULAR COMMUNICATIONS

The LineVision LUX uses cellular communications to transmit a 3D point cloud that captures the physical attributes of the power line: sag and blowout.




## SATELLITE COMMUNICATIONS

Our prototype uses satellite communications to transmit sag and blowout metrics that allow LineVision to reconstruct the power line in-house.




## DESIGNING A PROTOTYPE:

Sending data over satellite comes with several constraints, most notably the limitation of packet transmission size and power consumption.

# REDUCING THE AMOUNT OF DATA SENT IS CRITICAL FOR ACHIEVING LOW BANDWIDTH TRANSMISSION

Once the LiDAR scan is reduced solely to the relevant metrics for transmission, the power consumption of the prototype is comparable to the current LUX system and the transmission frequency consistently meets LineVision's requirements.

## IMPACT OF ON-BOARD CALCULATIONS

Computing the sag and blowout metrics on-device reduces the message size and power consumption, allowing for appropriate transmission frequency.

Current Transmission Size
to send all sensor data

New Transmission Size
99.4% Reduction
to send sag and blowout data

Ultimately, our prototype successfully sent data over satellite with the frequency promised to customers while accommodating power and bandwidth constraints. These are the first steps towards improving the scalability of the LUX for a low bandwidth satellite solution.