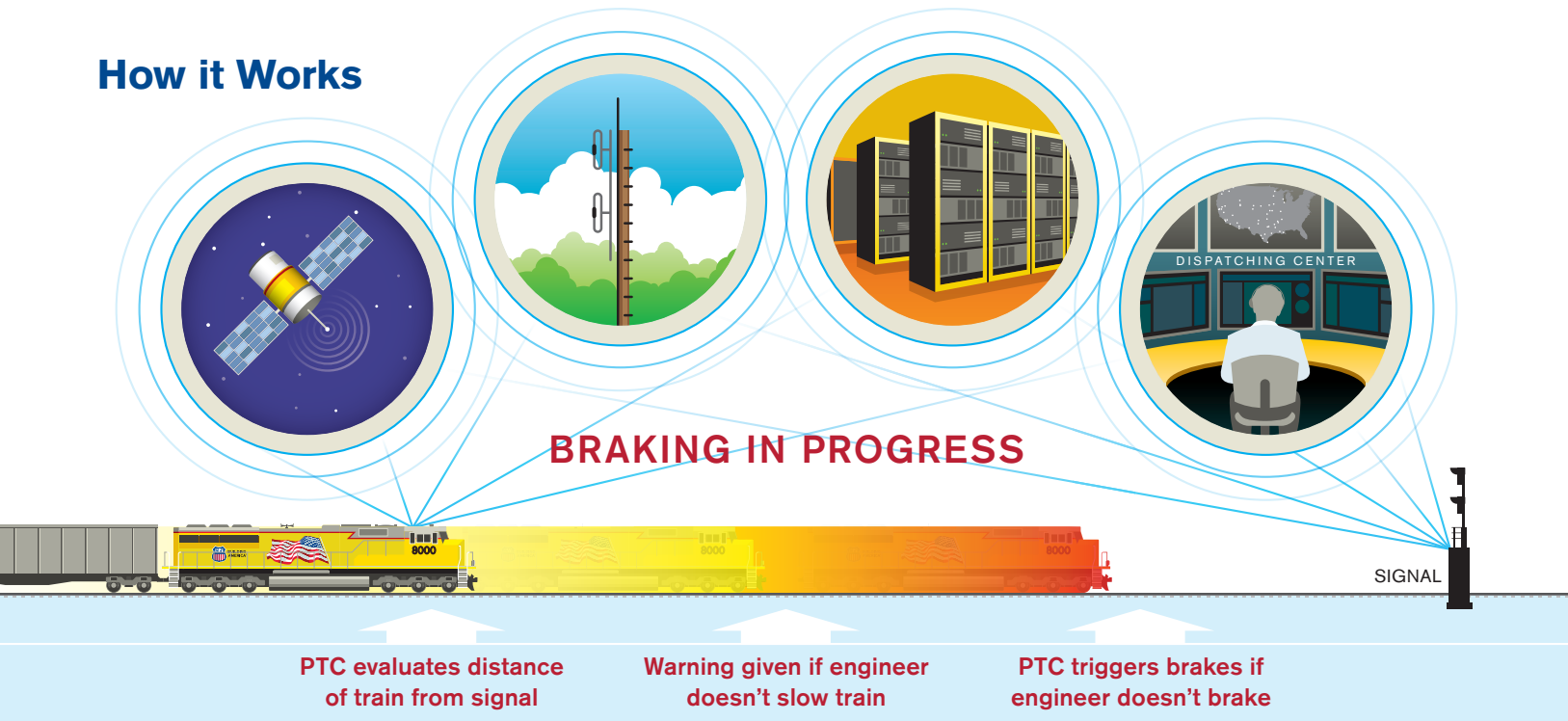


# UNION PACIFIC Positive Train Control



## How it Works



## Fast Facts

Union Pacific will invest: about **\$2.9 BILLION TO MAKE PTC OPERATIONAL**

Union Pacific will equip: **5,656 LOCOMOTIVES** and more than **20,000 ROUTE MILES**

Union Pacific will install: more than **10,000 WAYSIDE ANTENNAS** and **5,656 LOCOMOTIVE RADIOS**

Union Pacific accounts for: about **A THIRD OF THE INDUSTRY'S RADIOS, LOCOMOTIVES AND ROUTE MILES** required to implement PTC

Union Pacific has hired: about **1,000 EMPLOYEES** to work on PTC

## What it Does

Automatically stops a train before certain accidents caused by human error occur, including train-to-train collisions, derailments caused by excessive train speed, unauthorized train entry into work zones or movements through misaligned track switches.

Will not prevent vehicle-train accidents at crossings, stop trains when pedestrians are on the tracks, or prevent incidents due to track or equipment malfunctions.

## Scope Challenges

- Union Pacific's PTC system did not exist before the government mandate and is still being tested.
- PTC must be interoperable, meaning that passenger, commuter and freight trains are required to seamlessly communicate across all railroad systems.
- The PTC system requires integrating thousands of components across the telecommunications spectrum, such as GPS, Wi-Fi, radios, antennas, base stations and first-of-its-kind software that predicts when to slow or stop a train.

- PTC's all-new software must continuously relay critical information such as speed limits, train movement authorization, switch positions, work zone locations and other operational data. It must factor in locomotive and rail car mix; train length, weight and speed; terrain and signal aspects to determine safe stopping distances.