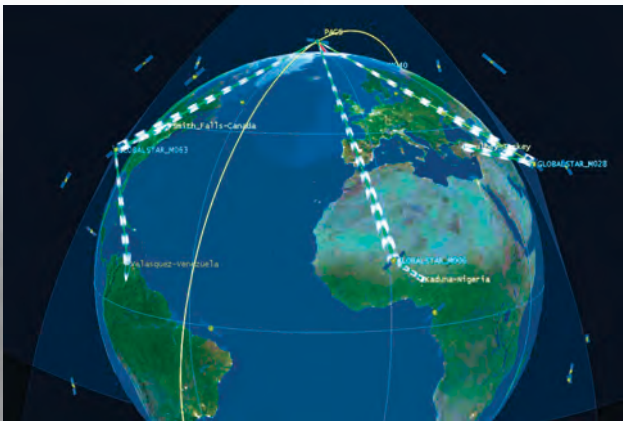




Payload Alert Communications System (PACS)

Comtech AeroAstro, Inc. (CAA) has developed a novel, new and revolutionary approach to support Low-Earth Orbit (LEO) Space Traffic Control called the Payload Alert Communications System (PACS). PACS provides low-cost, low-size, weight and power (SWAP) position, velocity, time information along with low-data rate host vehicle health and status reporting utilizing the CAA patented Code Phase Division Multiple Access (CPDMA™) waveform. CAA uses a unique tagging, tracking and locating device along with the existing Global Positioning Satellite (GPS) system and Globalstar data messaging infrastructure to provide PACS services to users.

Our PACS is an innovative approach to significantly reduce the manpower required to monitor and develop space situational awareness associated with LEO spacecraft of all shapes and sizes. PACS leverages the CAA-developed Sensor Enabled Notification System (SENS) technology developed for terrestrial tagging and tracking to provide the customer an easily integrated tool. This data availability can be critical during post-launch initialization and anomaly resolution, since the availability or lack of information for extended periods can be the difference between rescue and loss of an orbiting asset. PACS uniquely leverages existing SENS, GPS and Globalstar infrastructure for autonomous reporting of position, velocity, spacecraft ID and limited health and status data messages to provide the customer assured space situational awareness in the densely populated LEO space environment.

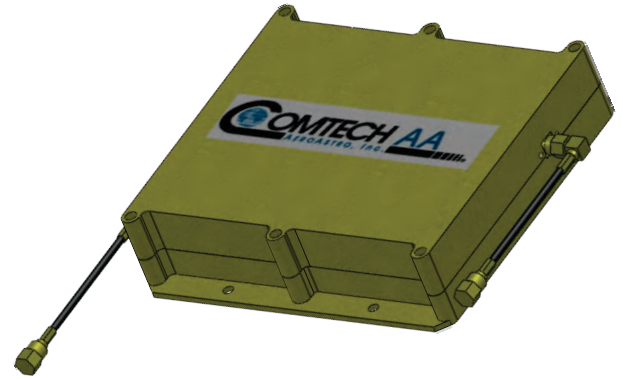


PACS Provides Critical Missions with Low Data Latency Direct to the User

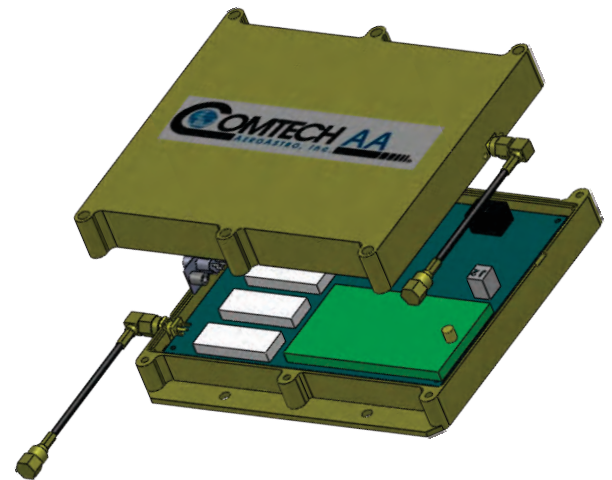
The primary objective of PACS is to provide round-the-clock state-of-health and state-vector data, independent of ground system infrastructure and constraints. Data latency timelines (minutes) are orders of magnitude faster than those accomplished by existing ground assets (daily to weekly). Spatial resolution of the data is substantially greater than commonly used radar or UHF / VHF communications system ranging methods. PACS also provides a valuable low data rate alternative communication path to the spacecraft owner, as the successful transmission probability with link closure (>90%) far exceeds traditional ground stations.

Field of View:	90° with single patch antenna
GPS Accuracy:	15m ±10m
Temperature Range:	-29 to +66°C
Interface:	RS-422 or RS-485 to host spacecraft
Transmission Success Rate:	>90%
Inclinations:	Equatorial to sun-sync (GEO in work)
Power:	<3W OAP, 5.6W peak
Size:	14.48 × 13.51 × 3.46 cm
Volume:	<150 cm ³
Mass:	<0.5 kg
Data Provided:	GPS position, velocity, time; PACS+host spacecraft state of health
Data Latency:	1 minute from transmission at host spacecraft to receipt at user-selected location
Encryption:	AES-128 and AES-256 available
Heritage TRL:	TRL 5 August 2010 TRL 8 by October 2011 (planned)

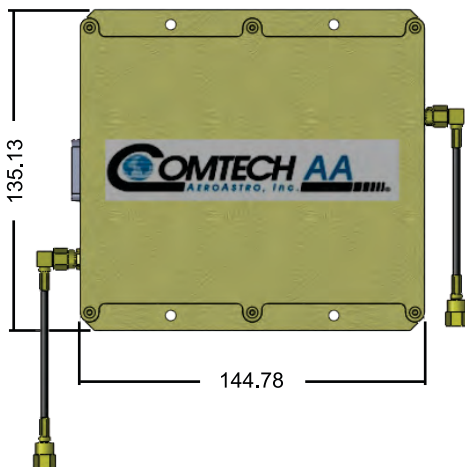
Performance specifications are subject to orbit inclination and altitude, GPS system characteristics, U.S. DoD operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length and multipath effects.



Low-Cost, Low-Size, Weight and Power, with Successful Transmission >90% for all LEO Orbits



Uses Globalstar and GPS Infrastructure to Provide Alert Communications



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