Commercial External Payload Hosting Platforms on the International Space Station for Space Research

Airbus Defense and Space in cooperation with Teledyne Brown Engineering

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NanoRacks External Platform

Mission end-to-end service for the launch, hosting and operation of *small* external payloads on ISS starting with Mission #1 early 2016.



Customer	Payload	Mission scope			
Yosemite Space	GumstixTM	 Principal investigator Kathleen Morse, Ph.D. Space-based radiation studies to investigate the feasibility of the Gumstix Computer On Module (COM) technology for use in non-critical computationally intensive space applications 			
Florida Institute of Technology	Charge Injection Device (CID) Sensors for Space- Based Extreme Contrast Ratio Imaging	 Principal investigator Daniel Batcheldor, Ph.D. Space-based test of an innovative and novel Charge Injection Device (CID) imager technology in the space environment 			
A-76 Technologies	Characterization of A-76 Corrosion Inhibitors in the Space Environment	 Characterize effectiveness of A-76 corrosion inhibitors and lubricants for metals in the space environment 			
Honeywell and Morehead State University, Space Sciences Center	TRL7 Validation of Dependable Multiprocessor (DM) Technology	 Principal investigators John Sampson, Ph.D., Benjamin Malphrus, Ph.D. Benchmark performance and radiation-induced computational errors of DM Technology while conducting computationally intensive processing in the space environment 			
Arquimea Ingeniería, S.L.U. (Spain)	REsettable Hold-Down and Release ACTuator (REACT)	 EU Horizon 2020 funded project with multiple European project partners (Arquimea Ingeniería, S.L.U., EADS CASA Espacio, Surrey Satellite Technology Ltd., AVS, Universidad del Pais Vasco, ESR Technology Ltd., Spacetech GmbH) In-orbit test of SMA-based actuators 			





Bartolomeo Concept

- Limited availability of external payload sites on ISS after 2017, but demand exists until ISS EoL
- Versatile external payload hosting facility meeting the demand of different types of customers at the same time
- Access to improved visibility of Earth and space on ISS Columbus module
- Attract new users outside classic microgravity / space research to ISS, new use cases





Bartolomeo Concept

- >> Bartolomeo platform envisaged to host multiple medium to large size payloads outside Columbus module
 - SpaceX trunk compatible platform, to be installed with one EVA / EVR
 - FRAM-size payloads locations
 - Smaller JEM Airlock compatible payload positions
 - Fully EVR compatible platform maintenance and payload exchange
 - Power and data management system
 - Cooling system
- With Teledyne's Multiple User System for Earth Sensing (MUSES) *Bartolomeo* provides
 - Instrument pointing
 - Instrument line of sight stabilization
- End-to-end platform operation by Airbus DS and Teledyne Brown in partnership with ESA and NASA under Space Act Agreement





Payload Customer Requirements

Element	Requirement
Payload mass	up to 250 kg
Payload volume	up to 1 x 1 x 1 m
View	 Nadir, Zenith, Limb Pointing and stabilization capability
Power	100 - 300 W, 500 W, 1 kW
Data	up to 100 Mbps
Cooling	up to 1.5 kW, active
Mission duration	1 to 5 years
Programmatic	 Access on short notice but without long-term commitment Short mission lead times (1 year is commercial standard for small payloads) Reliable booking of payload slots Low cost payload operation Private commanding and data link between customer and payload Protection of intellectual property and technology









Bartolomeo System Concept







Standard Payload Sizes







JEM-EF compatible





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Standard Payload Sizes







TELEDYNE BROWN ENGINEERING Everywhereyoulook



Item	JEM-AL compatible	JEM-EF compatible	FRAM-based	MUSES compatible	
Concept of operations	 Pressurized launch in soft stowage Transfer through JEM-AL Robotic installation 	Unpressurized uploadRobotic installation	Unpressurized uploadRobotic installation	Pressurized uploadTransfer through JEM-ALRobotic installation	
Maximum dimensions	640 x 830 x 1000 mm	816 x 1037 x 1856 mm	864 x 1168 x 1245 mm	ø 250 x 920 mm ø 460 x 920 mm	
Mass	up to 100 kg	up to 500 kg (TBC)	up to 500 kg	up to 100 kg	
Power	up to 200 W @ 120 V up to 100 W @ 28 V	up to 200 W @ 120 V up to 100 W @ 28 V	up to 1000 W	up to 224 W @ 28 Vdc	
Data link to avionics	up to 100 Mbit/s	up to 100 Mbit/s	up to 100 Mbit/s	up to 100 Mbit/s	
Cooling capability	up to 1.5 kW in total for all payloads				
Robotic interface	SPDM micro fixture	SPDM micro fixture	SPDM micro fixture	SPDM micro fixture	
Payload to platform interface	MDA wedge adapter	MDA wedge adapter	FRAM	MUSES standard interface	





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Contact

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