

# ACORN<sup>®</sup>

ADVANCED CONFIGURABLE OPEN-SYSTEM RESEARCH NETWORK

Oakman Aerospace, Inc.'s (OAI) Advanced Configurable Open-system Research Network (ACORN) development environment is a foundational capability to support spacecraft design, integration, and test. ACORN provides a scalable, rapidly reconfigurable, closed-loop, end-to-end space system modeling and simulation environment that implements a Modular Open System Architecture (MOSA).



ACORN is a complete life-cycle tool that provides for risk reduction and mitigation as well as increased mission assurance; all while enabling significant cost reductions throughout the mission.

ACORN is available for export commercially under the Export Administration Regulations (EAR) via the United States Department of Commerce under categories 9D515 and 9E515.



# ACORN<sup>®</sup>

*Spacecraft Simulation,  
Development, and Test  
Platform*

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# ACORN

## ACORN IS FOR:

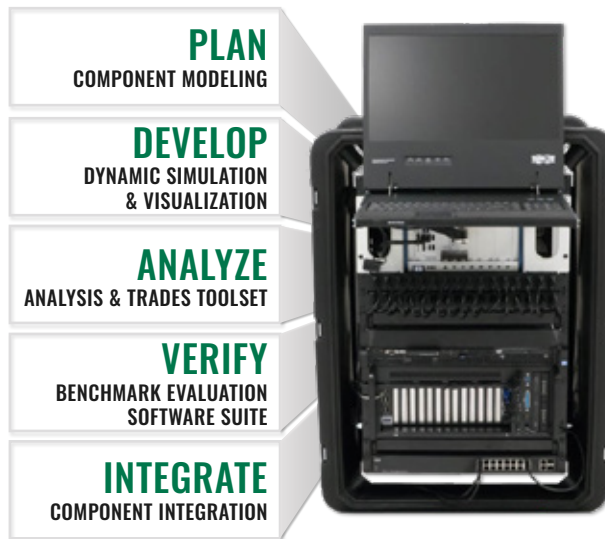
- Component manufacturers
- Spacecraft integrators
- Payload developers
- Constellation developers
- Space-enabled data analytics
- Commercial suppliers
- Space agencies and government
- Colleges and universities

## ACORN BENEFITS:

- Rapid integration of subsystems/components
- Flight software development and integration
- Up to 27-32% life-cycle cost savings
- Increase mission reliability, reduce risk
- Supports processor-in-the-loop and hardware-in-the-loop analysis and integration
- Faster than real-time sim capabilities
- Benchmark Evaluation Software Suite
- Hardware/software agnostic
- Scalable to support full end-to-end mission

## ACORN INCLUDES:

- Out-of-the-box flight scenarios
- Selection of pre-programmed generic subsystem and component models
- Flight software development/integration tools
- API for user customization, component integration, and custom models
- Benchmarking tools and test metrics
- Spacecraft health and status, backplane, and ephemeris data logging
- Multiple physical interfaces supported:
  - RS-422, I2C, MIL-STD-1553b, UART, SPI, SDIO, GPIO, Ethernet, Serial, etc.



# ACORN use cases:

## SOFTWARE-BASED MODELING AND SIM

ACORN offers a low-cost, scalable solution for software-based spacecraft modeling and simulation. The ACORN platform enables:

- Mission concept definition and review
- Design reference missions
- Satellite component database integration
- COTS components modeling
- Custom components modeling hardware
- Software benchmarking and test
- Subsystem/component trades and analyses
- Flight software development

## HARDWARE-IN-THE-LOOP (HWIL)

ACORN's modular architecture allows users to rapidly integrate hardware components and payloads to run in simulated or in real-time. This allows for:

- Component characterization/verification
- System/subsystem unit tests
- Payload integration and test
- Benchmark evaluation
- Global ACORN network testing
- Standard or custom flight scenarios

## COMPLETE MISSION LIFE CYCLE

ACORN is an effective tool cutting costs and increasing mission reliability throughout the entire program. Utilizing the rapid and reconfigurable space system modeling and simulation environment, take your mission from start to finish utilizing the same design reference scenarios throughout.

- Software-based modeling and simulation
  - Mission Concept Review
  - Systems Requirements Review
  - Design reference mission baseline
  - Trades and analyses
- Hardware-in-the-loop testing
  - Preliminary Design Review
  - Multi-component hardware integration
  - Payload integration and test
  - Critical Design Review
- Full spacecraft bus integration
  - Unit and system functional tests
  - Test Readiness Review

## MULTI-VEHICLE CONSTELLATION

For constellations with multiple satellite generations, ACORN provides many advantages that include:

- Unit verification testing
- Assembly line production
- Future generation compatibility
  - Tech roadmap implementation
  - Verify modifications and upgrades
  - Forward and backward compatibility
- Inter-satellite communication link analysis
- Heterogeneous constellation CONOPS

