



Aerospace, Defense, and Government

INDUSTRY SOLUTIONS

ni.com

Mission-Critical Assets Demand a Proven Test Strategy

Ensure your test strategy matches your organization's commitment to quality and reliability.

Whether you're building and maintaining test assets to support long life cycle programs, designing next generation radar and electronic warfare systems, or deploying digital transformation initiatives across your enterprise, you need an experienced business partner that understands your requirements and can help you maximize quality, reliability, and overall mission readiness.

NI has served the aerospace and defense industry for more than 40 years, and we remain committed to supporting your pursuits. With our customizable, off-the-shelf platform, NI can help you design, test, and maintain your increasingly complex assets.

Meet demanding technical requirements with industry-leading accuracy and performance.

Stay on schedule and on budget with a customizable off-the-shelf platform.

“NI’s modular design offers the highest performance, with superior levels of scalability and upgradability. This framework reduced our software development, testing, and integration efforts by 70 percent.”

Balaji PK,
Software Design Engineer, Moog



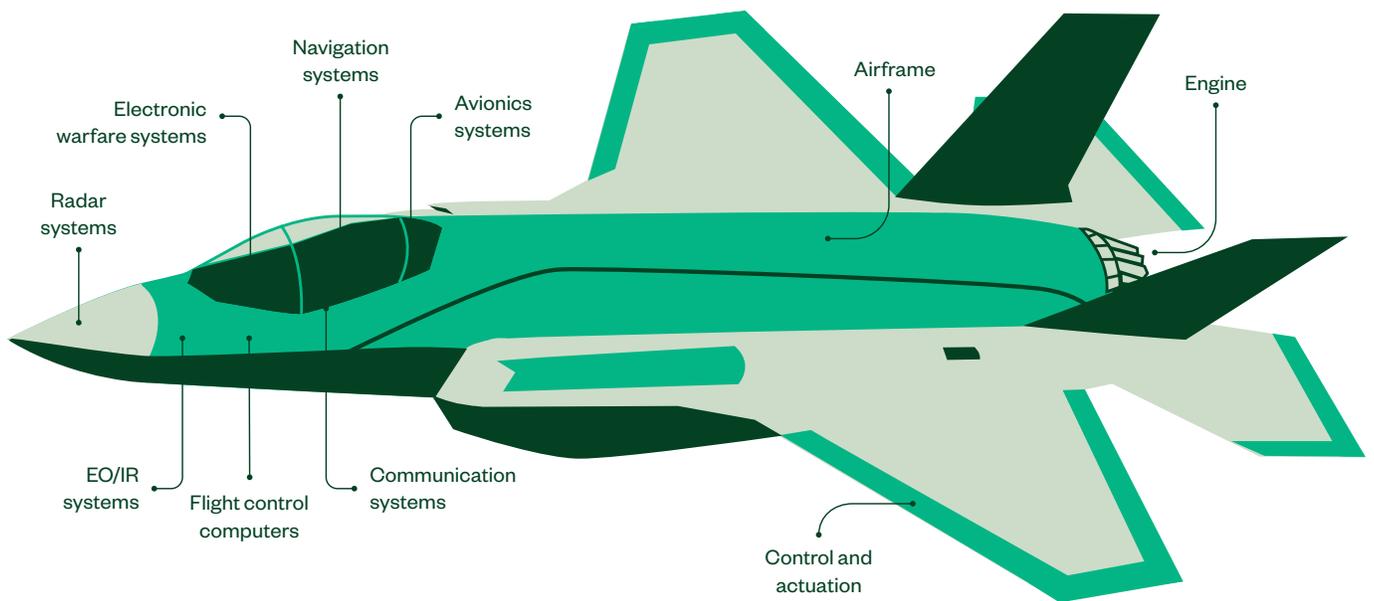


Aircraft

From avionics to engines, aircraft and their subsystems are becoming increasingly complex. Unfortunately, test schedules and expectations don't scale as systems become more sophisticated. You're asked to do more with less to maintain the caliber of your mission-critical assets while adhering to strict timelines and monetary constraints.

NI is here to help. We offer products and services that span the entire spectrum of development phases—from design to post-production maintenance—to keep you on track and within budget without sacrificing quality or reliability.

With our customizable, off-the-shelf platform, you can design and test numerous aircraft subsystems, including those found on rotary and fixed-wing platforms across both commercial and military applications.



Design and Validation

Iterate on designs quickly with digital prototyping, simulation, and hardware-in-the-loop test.

Production Test

Maximize quality, improve efficiency, and manage distributed systems with automated test equipment.

Fleet Maintenance

Diagnose and repair issues to prevent downtime and ensure mission readiness.



Satellites and Launch Vehicles

Space is the final frontier of exploration and one of the toughest environments for design and test. New industry paradigms are forcing space and satellite organizations to lower the cost and shorten the timelines of launches while still adhering to standardized testing procedures. Commercial partnerships are expanding, launch vehicles are evolving, and payloads are transforming. These dynamics add to the complexity of testing and require organizations to invent new ways to reduce cost while accelerating product delivery. The NI platform empowers you to reuse software and hardware development across programs and teams while providing the flexibility to embrace changing requirements.

NI's COTS hardware with customizable configurations and functionality enabled with FPGAs allows quick adaptability to changing test requirements. Connect multiple teams with a single test platform to accelerate development time for satellites and launch vehicles. Our test capabilities cover a breadth of subsystems across launch vehicles, satellites, and ground stations.

Prototype, Design, and Brass Board

Iterate on designs rapidly with digital prototyping, subsystem and payload emulation, and board characterization.

Engineering Models and Flight Hardware

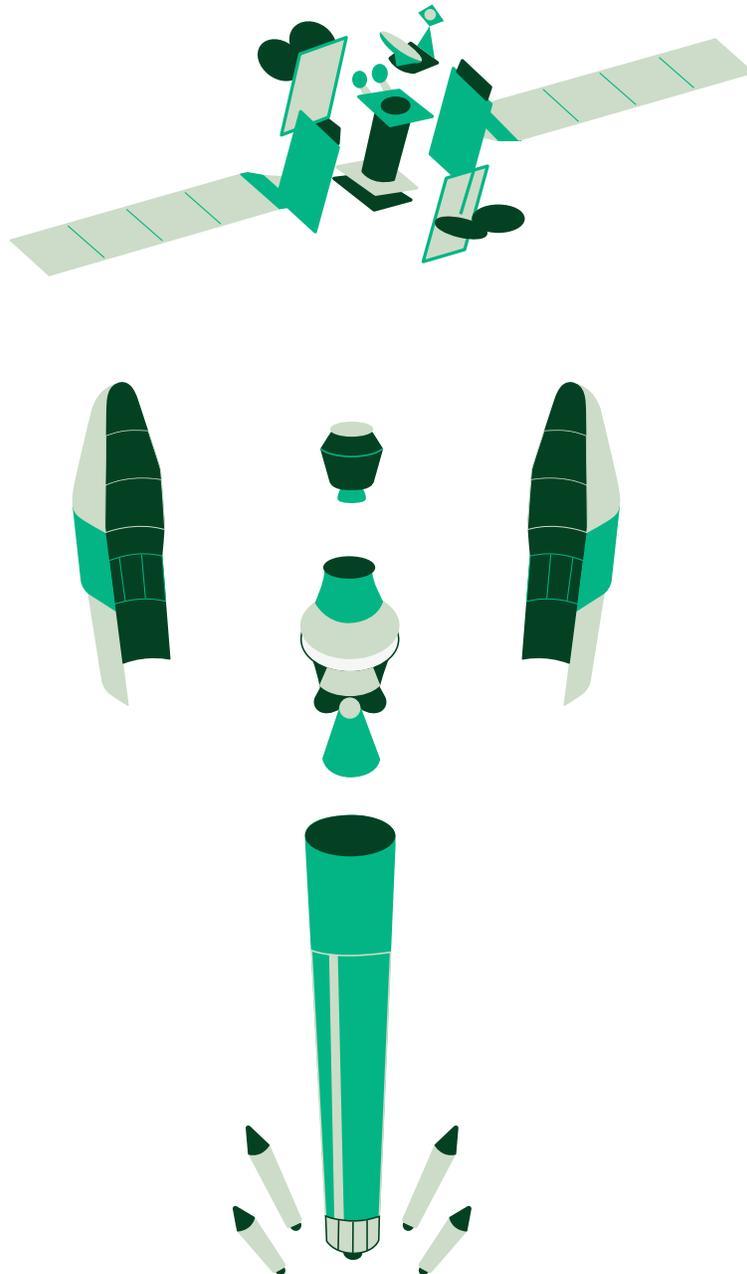
Automate the verification and validation of electronics, RF systems, and control logic, from the components to the complete vehicle.

Integration and Test

Predict and adapt to system and environmental requirements quickly with digital twins, environmental test, and mechanical characterization.

Launch Platform and Ground Support

Reduce risk with a standardized approach to system checkout, launch pad monitoring, mission control, and ground communications.



“We’ve based a large portion of our operation on NI’s platform, from our multi-level avionics hardware-in-the-loop test benches, to flight acceptance and qualification testing, to launch control, to monitoring the rocket and payload status on the aircraft. NI’s platform is allowing us to stay on the aggressive timelines that we have set for ourselves. It gives us the agility to innovate rapidly and adapt quickly.”

Omar Mussa,
Lead Avionics Test Engineer, Virgin Orbit

Land and Sea Platforms

Multi-domain operations continue to play an increasingly important role in defense strategies. Like airborne platforms, land and sea systems are becoming more sophisticated—incorporating new materials, technologies, and components to improve capability and mission readiness. Let us help you deliver cutting-edge C4ISR systems and reduce the cost of validating and maintaining components of platforms necessary to the security of the warfighter.

Supporting Surface and Underwater Sea Platforms

The mission systems aboard modern naval vessels rely on the latest technology to function. Make sure this equipment is in top form by partnering with NI in the design, test, and maintenance of C4ISR and electronic control systems throughout the vessel.

Electronic Warfare

NI enables the design, test, and deployment of electronic warfare systems to secure land and sea domains, from drone defense to communications protection.

Tactical Radios and Networks

Be sure the connection between ground and air units is always ready with solutions for legacy and future tactical radio design and maintenance.

Equipping the Vehicle and the Warfighter

Let us show you how to apply the fast-moving operational innovations in sensors, control systems, and communications from the automotive industry to your defense capabilities. We also offer industry-leading solutions for personal electronic warfare design and prototyping, as well as field test and maintenance of tactical communication networks and radios.

Electromechanical and Control Systems

Expedite the test process and maximize confidence in complex electromechanical control systems with test systems that scale from simulation to production and maintenance.

Structural Test and Monitoring

Ensure the mission-readiness of sea-based platforms with high channel count systems for stress/strain test and rugged, deployable systems for monitoring critical ship infrastructure.



Weapon Systems

Munitions and defeat systems are critical to national security. The payloads, telemetry, tracking, and communication systems on these munitions, as well as the defeat systems intended to combat them, must follow proper protocol in all mission scenarios. Work with NI to test every scenario in every phase of the weapon system life cycle.

Communications Test and Monitoring

Ensure that launch infrastructure and munitions systems communication is operational in all scenarios, from validation and production to deployment in the field.

Telemetry and Control Systems

Guarantee that weapons systems find the intended target or abort reliably with test systems that simulate millions of scenarios with mission hardware and software.

Electromechanical System Test

Design and validate actuation, propulsion, hydraulic, electric, and fluid systems that operate reliably over time and execute the mission without fail.

Advanced Subsystem Test

Take advantage of our cutting edge software-defined instrumentation platform to test seekers, terrain following radar, and EO/IR subsystems.





Electrical and Mechanical Systems

Every aerospace and defense vehicle, aircraft, and asset relies on dozens—potentially hundreds—of electrical and mechanical subsystems that must work in perfect concert with one another. From fluid and safety systems to full fly-by-wire systems, these components must be put through a barrage of tests and simulations to ensure reliable operation across all mission scenarios. As these subsystems evolve to meet the needs of future missions, so too must your approach to test and system integration.

Board Electronics

NI's more than 600 PXI and 100 CompactRIO modules provide coverage across analog, digital, and avionics communications busses. Automate these measurements and analyze data quickly across design, parametric validation, and functional test with NI's software-centric COTS hardware.

Mechanical Systems

Perform life cycle or durability tests more efficiently with quick integration and synchronization of sensors, signal conditioning, and actuation systems on a flexible and open platform from NI. Leverage our flexible and open software to integrate third-party hardware to expand your coverage even further.

Line Replaceable Units and Control Units

Perform multiple types of model integration, rapid control prototyping, and digital communication test. When combined with NI's modular COTS hardware, you can create powerful and maintainable test systems with software-controlled real/simulated component switching and fault insertion.

Structures

Create high channel count distributed measurement systems with tight synchronization. Design high-performance structural test systems on an open vendor platform with little to no programming required.

Scalable Solutions Across the Product Life cycle

As you integrate complex systems, NI’s portfolio empowers you to standardize test approaches to shorten program timelines, share data with your peers to reduce risk, and maintain flexible test systems that evolve with changing requirements. This flexible approach to test means you can scale to follow the design “V” and adapt quickly to changing program requirements.

Physical and Mechanical Test

NI’s software-centric approach to test offers a single experience across control and measurement programming, with tight synchronization that enables optimized characterization and durability test.

Production and Manufacturing Test

We offer the only solution that includes a full suite of modular software components for production test of electronic systems, including hardware integration, code modules, test executives, system management, and MES integration.

System Integration Test

Leverage NI’s modular hardware and software-centric test equipment to integrate your physical, mechanical, and electronic

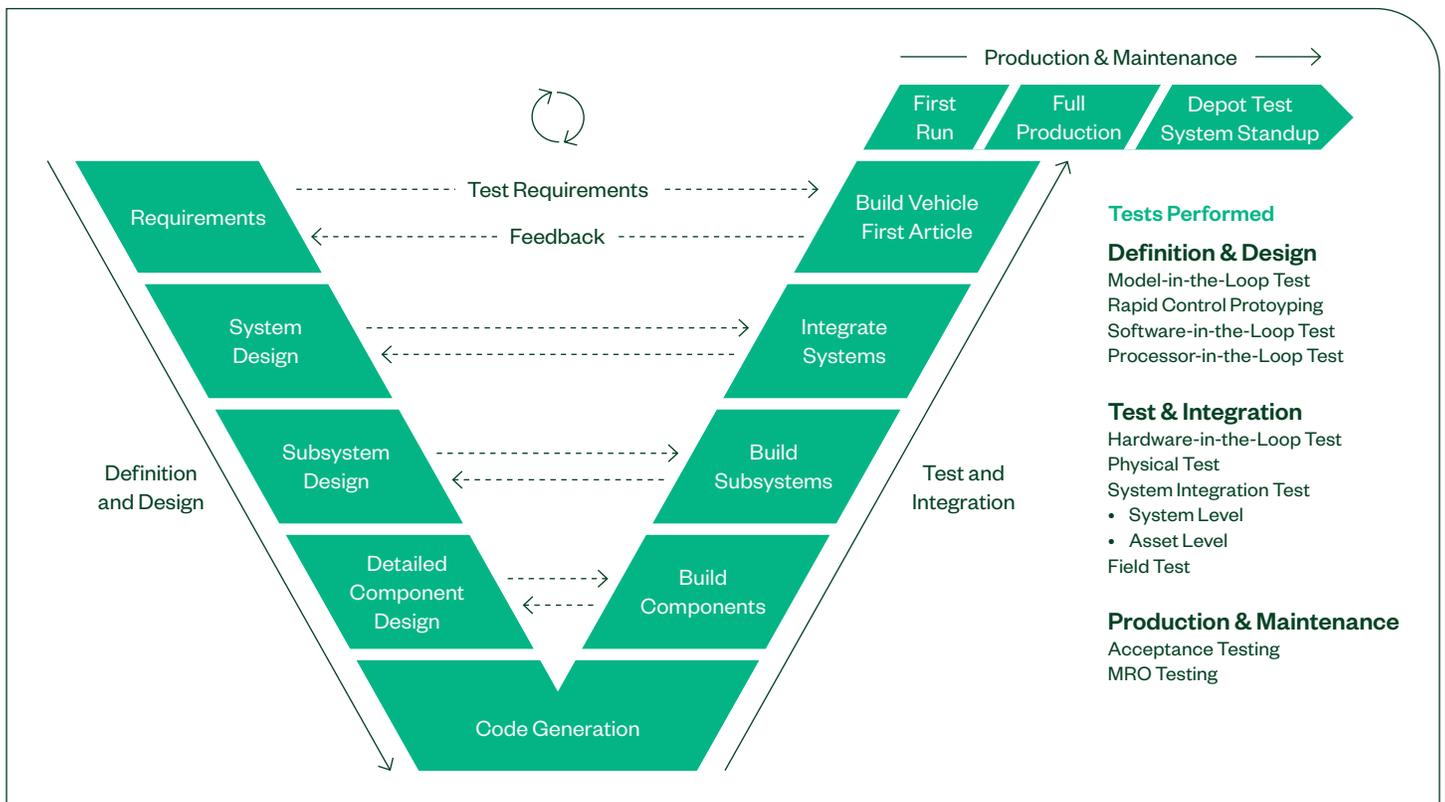
systems and simulate environments and mission scenarios at the complete asset or sub-system level.

Embedded Software Validation

Comprehensively validate embedded software earlier in the design process with advanced real-time hardware-in-the-loop testing, including digital twin model integrations, software-controlled faulting, real vs. simulation switching, and standardized, open test system architectures.

Depot and Maintenance

Perform diagnostics on flight systems, mission systems, and other LRUs with NI instrumentation and software that not only meet the measurement needs of these systems but also inform condition-based maintenance prognostics to keep your mission-critical assets operational.



Radar

Radar systems are experiencing considerable technology disruption because of the rapidly changing electromagnetic battlespace. Active electronically scanned arrays, ultra-wideband technology, and cognitive radar systems present new design and test challenges for even the most experienced organizations.



“The NI user-programmable FPGA instruments have delivered immediate and striking economic benefits across all project stages, from non-recurring engineering (NRE), to production, to life cycle management. This has led to a total project cost reduction of more than 50 percent.”

Armando Arenai,
NATO Support Agency (NSPA)

Rapidly Prototype Radar Waveforms and Architectures

Threats and countermeasures continue to evolve at a rapid pace. Today, radars must track agile, hypersonic weapons, resolve swarms of drones, and detect low-RCS aircraft. Radar system developers are expected to prototype new concepts quickly, such as cognitive techniques or fully digital beamforming, to counteract emerging threats, increase performance and capability, and assure operation in contested EM environments. COTS software defined radios (SDRs) with an integrated software workflow accelerate the transition from concept to testbed to deployed system.

Validate the Performance of Modern Radar Systems

Parametric and component-level testing isn't enough to adequately test modern radar systems. Advanced radar architectures and trends toward RF sensor convergence and cognitive radar necessitate system-level testing with modeling and simulation of the surrounding environment. Radar target generators built on COTS I/O and FPGA-based signal processing greatly reduce the risk of radar systems failing while remaining adaptable to new threats.

Electronic Warfare

Spectrum superiority has never been more critical to success on the battlefield. Amid an increasingly contested and congested electromagnetic spectrum, the ability to reliably operate communications and navigation systems while deceiving and disrupting the adversary creates a significant tactical advantage. Software defined radio (SDR) provides the ideal platform for developing and deploying electronic warfare systems and the flexibility to adapt to modern and constantly evolving threats. COTS technology is ideal for system-level test of complex, intelligent EW receivers, reducing the need for flight test hours by modeling and simulating a multi-emitter environment.

Electronic Attack

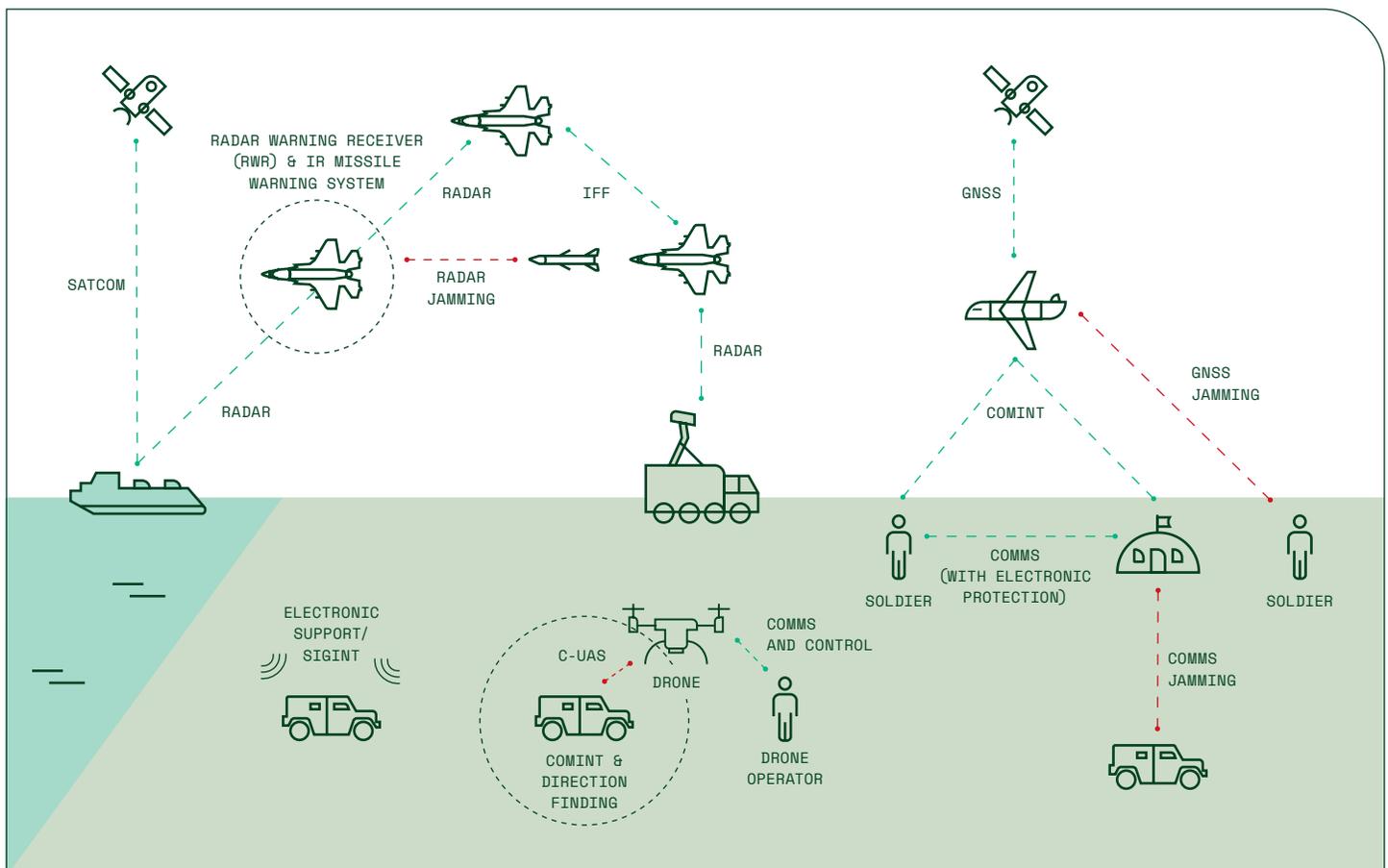
Be disruptive. Use COTS SDR to rapidly design and deploy systems that deny hostile access to the electromagnetic spectrum, such as communications jamming and counter-UAS systems.

Electronic Protection

Be resilient. Prototype systems capable of assured operation in contested and congested electromagnetic spectrum with techniques like cognitive radio and frequency hopping.

Electronic Support

Be aware. Deploy wideband, multi-channel acquisition systems with robust connectivity capabilities that support multi-domain operational and situational awareness through signals intelligence and direction finding.



Communication, Navigation, and Surveillance

Modern vehicles and aircraft use a variety of communications systems to transmit and receive voice and mission data for manual, automated, and autonomous flight. NI has solutions for designing, prototyping, and testing everything from cutting edge, modern systems secured for electronic warfare to maintaining operations and mission readiness of legacy transponders.

Secure Communication Networks and Radios

NI's SDRs enable engineers designing tomorrow's radio protocols and signals while modular, scalable PXI systems power modern manufacturing, field, and depot test systems.

GNSS and Positioning Systems

NI's global partners provide test solutions for GPS, Galileo, Beidou, and other positioning transmitters and receivers on a variety of platforms, including aircraft, sea, and handheld systems.

NAVAIDS and Surveillance Transponders

Test and maintain TCAS, ILS, ADS-B systems, and more, with systems built on software-connected NI RF instrumentation.





Algorithm Design and Prototyping

Radio frequency test equipment that includes FPGAs and digital signal processing enables fast design iteration and simulation of mission-critical communication innovations.

Record and Playback

Stream and record accurate and complete radio and environmental data with up to 1 GHz of instantaneous bandwidth in the PXI instrumentation platform.

Manufacturing and Maintenance Test

Ensure quality and reliability and diagnose and repair issues with low-cost, high-throughput PXI test systems.

RF and Microwave Component Test

The ability to harness and defend the electromagnetic spectrum is critical to modern aerospace and defense organizations worldwide, making the characterization and production test of the RF and microwave components within these systems essential to mission success. Technological innovations like higher power, more efficient circuit design, increased digital functionality, more efficient spectrum usage, and software defined modular antenna architectures create significant challenges for design and test engineers alike. Using a consistent and customizable platform from the lab to production improves your time to market while reducing capital equipment costs and increasing the efficiency of your team.



DC to RF

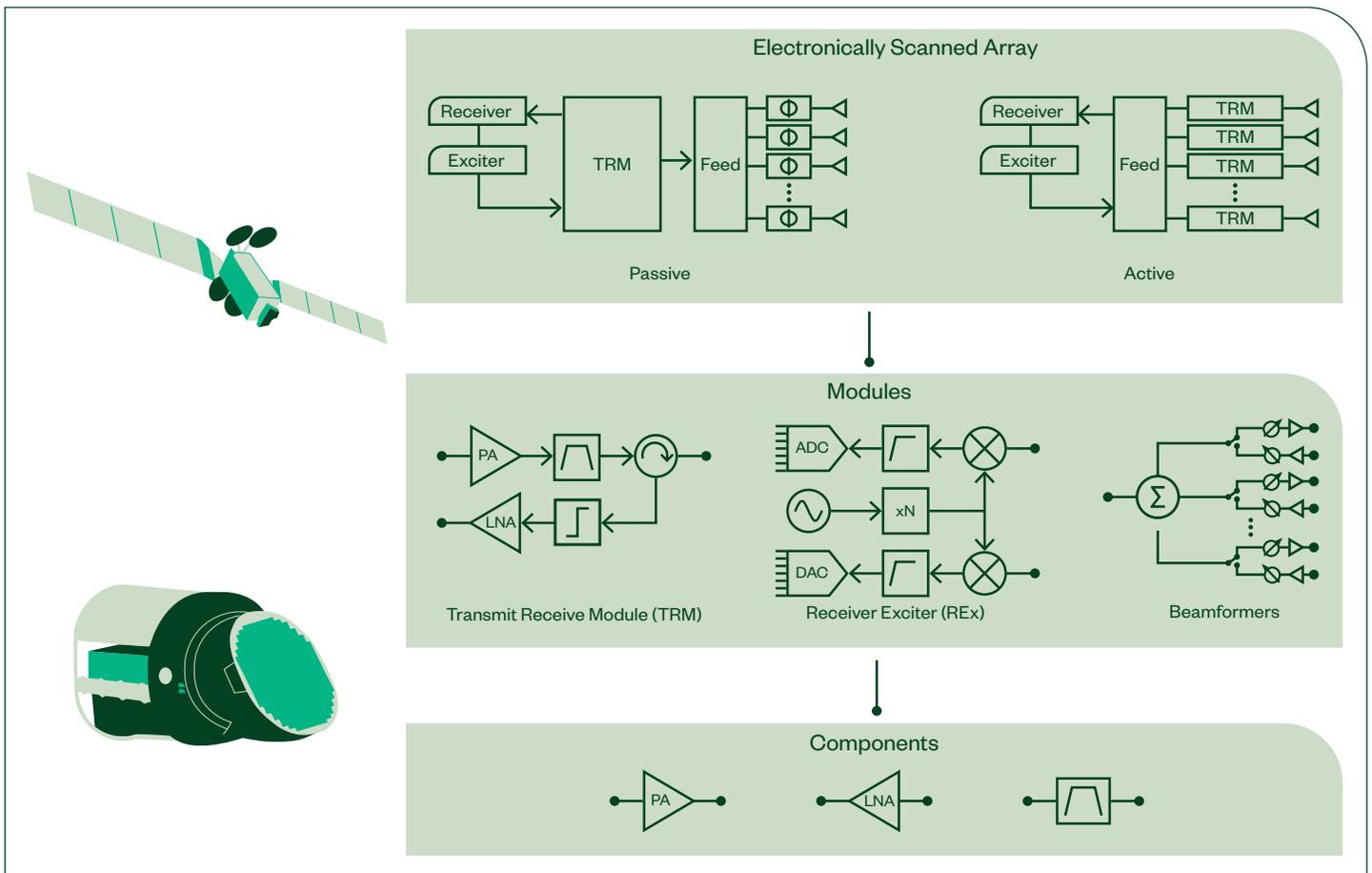
NI offers more than 600 different PXI modules ranging from DC to mmWave, covering L through Ka bands. Because PXI is an open industry standard, nearly 1,500 products are available from more than 70 different instrument vendors.

Sub-Nanosecond Synchronization

Tightly synchronize baseband and RF instruments to sub-nanosecond accuracy to offer a complete solution for RF and baseband I/Q test.

Wide Instantaneous Bandwidth

With up to 1 GHz of instantaneous bandwidth available, NI RF instrumentation is well suited for testing key system components and modules for radar, electronic warfare, and satellite communications.





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NI Services and Support

Hardware Services

Minimize downtime, save on maintenance costs, and simplify logistics with world-class service programs for hardware.

Training and Certification

Develop 50 percent faster and spend 43 percent less time on code maintenance with NI training courses. Also validate your expertise with NI certifications.

Technical Support

Get started with NI products faster or troubleshoot tough issues by contacting NI applications engineers who are ready to help via phone and email.

Consultation and Integration

Leverage our extensive network of Alliance Partners and NI systems engineers for assistance with prototyping, feasibility analysis, consulting, and systems integration.

Software License Programs

Streamline NI software management by accessing multiple levels of training, technical support, and tools through your software license.

Technical Resources

Access volumes of self-help information at ni.com including application tips, example programs, and developer communities.

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