“There is nothing so far removed from us to be beyond our reach, or so far hidden that we cannot discover it.”

— Rene Descartes
BOLD IDEAS ARE NEW REALITIES

Upload mission apps in space. Build constellations, virtually. Gather information and prioritize it in nanoseconds. Our engineers are making space smarter.
Mixed-fleet constellations – Whether it’s to survey the Moon or do cloud computing in space, we’re accelerating nanosats to help every customer boost resiliency, from government to commercial, in every type of constellation.

On-orbit solutions can take different shapes. Constellations is a mobile app that assesses possible constellation architectures by adjusting fundamental factors like orbit altitude, satellite life and duration of full service. The app helps users explore new concepts, test theories and trade key performance parameters against the mission and business case.
Satellites that work like smartphones. Bus, payload, and ground software that produce an application platform with a secure, common infrastructure and re-useable components. With SmartSat technology, customers can change what a satellite does in orbit and evolve with the mission.

- **Multi-Core Processing** for fast, actionable data
- **Adaptable Beam Footprints** for mission changes
- **Flexible Architecture** scale down to cubesats, scale up to large satellites
- **Faster to Build** common architecture reduces integration time
- **Adjustable Bandwidth** responds to user demand

*SMARTSAT™*
Distributed tasking and tip/cue – Easing the burden from operators.

We’re developing the ability to distribute sensing or computing tasks between nodes, or for one node to tip another to begin a sensing or processing task.
Pony Express – These powerful nanosats test and mature mesh networking powered by HiveStar™, distributed computing and storage using SpaceCloud™, and they demonstrate how Joint All-Domain Operations will enable data-driven decision making at orbital speeds.
Powerful options – Commercial communications customers are our first to take advantage of a capability leap with LM 2100 satellites.

Lockheed Martin built this new class of satellite with multi-mission solar arrays for increased power, processors that can be updated as needs change and with electronically steered antennas to move beams where people need it most.

**LTE over satellite** – We’ve pushed beyond typical satellite phone calls and made it easier to connect with each other on Earth with direct-to-space voice, data and text.

LTE over satellite enables assured communications continuity during disaster relief efforts and other high-volume events.
More of the big picture – Integrated mission capabilities, including cyber, ground and sustainment.

Lockheed Martin Space has the experience and perspective of a full-systems provider, from research and design to production and on-orbit operations, with robust ground networks to deliver information to users.
3D printed omni antenna on GPS – A totally new antenna.

A totally new way of building it. This antenna is an example of internal investment, developed by the RF and Radar Payloads Center of Excellence, which produced a 3D printed common product that eliminates time-consuming steps of the assembly process.
Do more with Flexible Antennas – Working with Ball Aerospace and Kratos/RT Logic, we are building a new kind of antenna that enables multiple satellites to simultaneously connect with one ground antenna over multiple frequencies.

That’s a big change from parabolic antennas. Our phased array antenna systems offer multiple, electronically scanned beams and software-defined satellite modems supporting reliable operations and reduced maintenance costs. One cyber-resilient Multi-Band, Multi-Mission phased array antenna is the equivalent of multiple dishes, enabling better performance, connectivity and affordability. MBMM is just one of several developing new modern, adaptive antennas for today’s hybrid space architectures.
DATA-DRIVEN MISSIONS

Mountain of data – AI helps everyone work smarter.

It prioritizes information with speed and accuracy like never before. Our systems connect the dots and help users make better decisions.
**Processing in space** – Edge processing reveals the most important information faster.

By fortifying our space payloads with more processing power, we can send only the most important information to users on the ground, speeding decisions and saving bandwidth.
Global Automated Target Recognition uses open-source deep learning libraries to quickly identify and classify objects or targets in large areas across the world, potentially saving image analysts countless hours manually categorizing and labeling items within an image. That's why it won a USGIF 2020 Achievement Award.
Software Factory – Deliver capability at the speed of relevance.

By utilizing agile methodology, our team capitalizes on common code whenever possible to rapidly deliver mission capabilities at a lower cost with the same level of quality and mission success our customers have come to expect — meeting U.S. Department of Defense criteria for a software factory including key security requirements.
Agile DevSecOps – Agile lets us deliver iterative features and fix bugs as we go.

It dramatically improves the software engineering quality and delivery timelines while avoiding cost overruns that previous software delivery models sometimes face. Also, with embedded security, we are delivering the cybersecure mission capabilities needed for national security. Plus, open systems architecture ensures any vendor can integrate into the system.
Modified resiliency model – Space is a key enabler that must be protected end-to-end.

That’s why Lockheed Martin developed the [Cyber Resiliency Level model](#) to better evaluate cyber resilience and guide improvements to systems.

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<thead>
<tr>
<th>Category</th>
<th>LEAST</th>
<th>MOST</th>
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<tbody>
<tr>
<td>Visibility</td>
<td>Limited</td>
<td>Aware</td>
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<tr>
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<td>Routine</td>
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<tr>
<td>Requirements</td>
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<td>Siloed</td>
<td>Program</td>
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</tbody>
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CLR1: LEAST
CLR2: LEAST
CLR3: MOST
CLR4: MOST

Ad-hoc | Managed | Optimized | Adaptive
Visibility | Limited | Aware | Informed | Predictive
Cyber Hygiene | Basic | Routine | Risk-Based | Self-Correcting
Requirements | Bolted-On | Compliance-Based | Threat-Based | Holistic
Test and Evaluation | Minimal | Standard | Integrated | Effects-Based Modeling
Architecture | Volatile | Standardized | Modular | Evolutionary
Information Sharing | Siloed | Program | Domain | Mission Partners
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