DISCOVER

Enabling Space 2.0

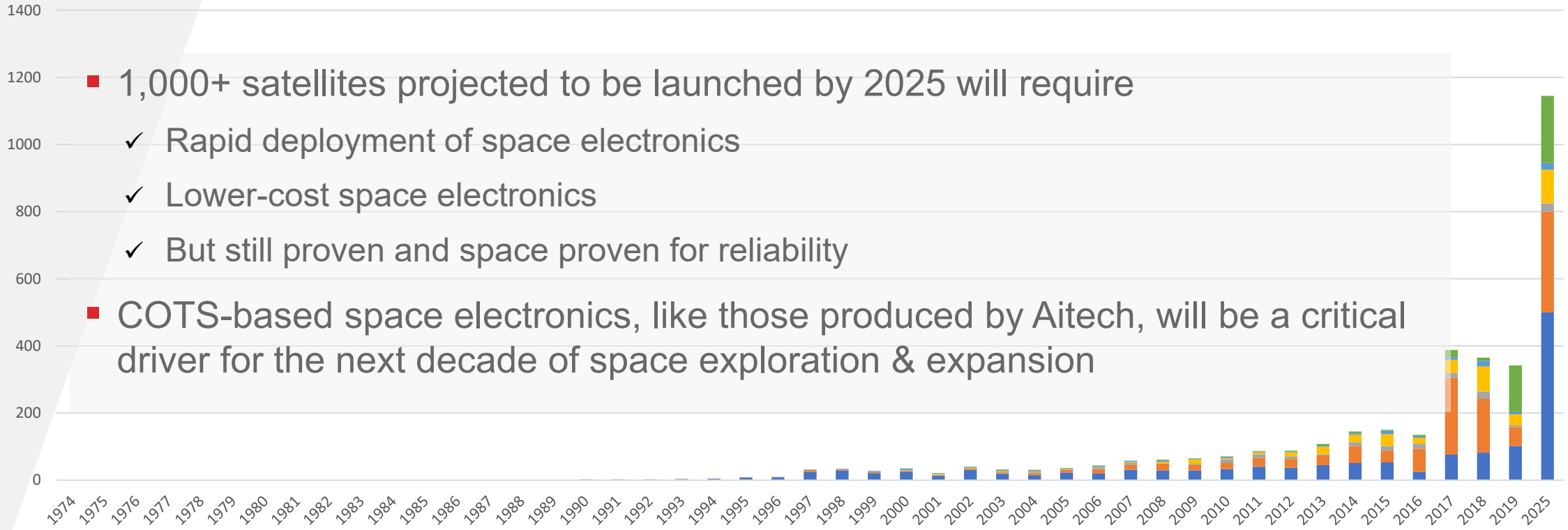
Driving Affordability & Reliability in Space with Mil-Aero COTS

Pratish Shah, General Manager of Aitech USA

The Next 10 Years

Will Not Look Like the Last 10 Years…

- 1,000+ satellites projected to be launched by 2025 will require
  - ✓ Rapid deployment of space electronics
  - ✓ Lower-cost space electronics
  - ✓ But still proven and space proven for reliability
- COTS-based space electronics, like those produced by Aitech, will be a critical driver for the next decade of space exploration & expansion



Source: MIT Technology Review

…Space 2.0 is Today

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Space Electronics Driving Space 2.0

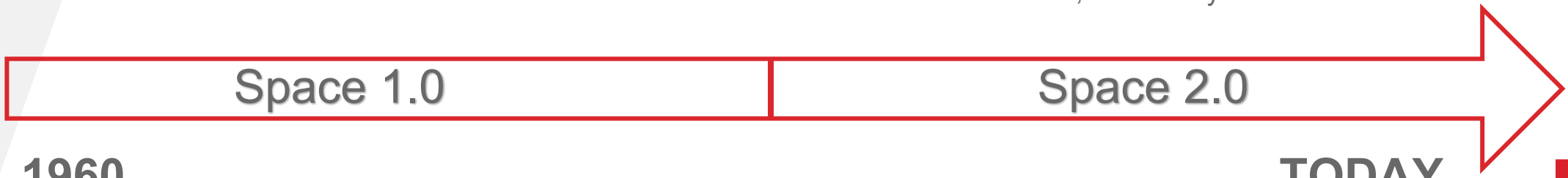
Lower Cost, Continued Reliability, New Capabilities

Specialization Model – Each challenge overcome by specialized effort and development

- Market driven by government end-user and very few Prime contractors
- Launch cost about ***$450M***
- Low volume driven by few large satellites
  - Each project is **NRE** focused
  - Once built, project was done; little recurring business
  - Pedigree and unique specialized skills won business

Rejection of Specialization Model

- Building new space infrastructure based on new technology; not based on past work
- Launch cost about ***$60M***
  - Project is more **COTS** and production focused
  - Design once and build repeatedly
  - Cost & schedule wins business; more in common with ***mil-aero business*** and not Space 1.0 business
  - Large constellation opportunities
  - Less NRE, thus ability to scale business



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Challenges Being Solved with

Next-gen Space Electronics

- Common COTS/MOTS infrastructure:
  Deliver timely and cost-effective solutions
- Improved Connectivity:
  Creating a software-defined satellite infrastructure
- Reliable, Integrated Computing:
  High performance edge computing
- AI/ML Implementations:
  Advanced multi-processor architecture
- Digital Backbone:
  Unified, flexible, scalable communication infrastructure for the increasing number of IoT technologies being implemented into space missions

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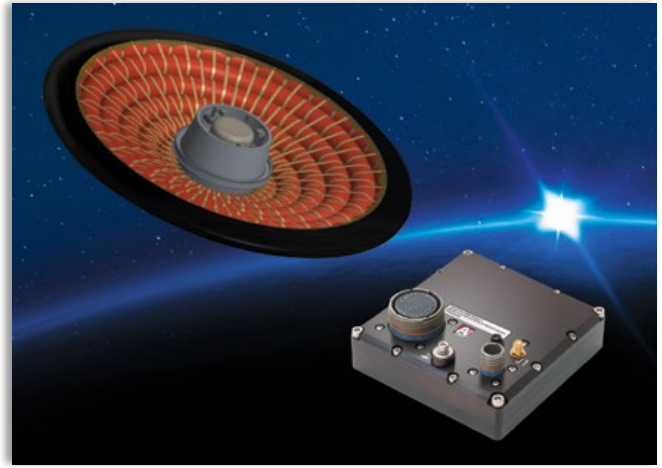
Progression of Space Innovations

Current & Future Missions Developments

- NASA LOFTID
  - First deployment of space AI GPGPU supercomputer for short-term space missions (S-A1760 Venus™)
  - Validated new cost-efficient Series 300 offering for NEO/LEO



- Artemis I (Orion & Callisto)
  - Setting the stage for the return of manned missions to the moon
  - Provided critical communication infrastructure and HMI processing capabilities on recent uncrewed test flight
  - Aitech technology powered mission

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Progression of Space Innovations

Current & Future Missions Developments (con't)

- Virgin Galactic
  - Strengthening space tourism as a growing, obtainable industry
  - Provided rocket motor controller (RMC) for VSS (Virgin Space Ship) Unity

- NASA HALO
  - Lunar gateway serving as hub for further, long-term missions to deeper space regions
  - Space-qualified, flight-proven SP0-S Series 500 uses both NASA Level 1 and Level 2 EEE-INST-002 components to meet program's reliability requirements, while keeping program costs to a minimum

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Mil-Aero to Space

Lower Risk, Lower Cost, Rapid Deployment and New Capabilities for Space 2.0

A176
Proven mil-aero GPGPU enabled system, UAV, ground vehicles, etc.

Transition to Space

- **Lower Risk** – Proven design!
- **Lower Cost** – Built on volume
- **Rapid Deployment** – COTS system
- **Capabilities** – Edge processing, artificial intelligence in space!

No Loss of Functionality

- Ultra Small Form Factor – 129 mm [5.1″] square, < 1 kg [2.2 lbs.]
- Pascal™ Architecture GPU w/256 CUDA® cores
- NVIDIA Denver 2 Dual-Core ARM® CPU + Cortex® A57 Quad-Core ARM® CPU
- 1 TFLOPS
- H.264/H.265 HW Encoder
- Best Available Performance per Watt – 60 GFLOPS/W

S-A1760
Proven space GPGPU enabled system, payloads, satellites, Etc.

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Mil-Aero to Space

Lower Risk, Lower Cost, Rapid Deployment and New Capabilities for Space 2.0

A664
Proven Mil-Aero Ethernet Switch, UAV, Ground Vehicles, etc.

Transition to Space

- **Lower Risk** – Proven design!
- **Lower Cost** – Built on volume
- **Rapid Deployment** – COTS system
- **Capabilities** – Network connectivity in space, connected devices, connected experiments

No Loss of Functionality

- 12x 10/100/1000 Base-T Ports
- Full Wire-speed Non-blocking Forwarding
- Access Control List (ACL) support
- QoS Packet Scheduling
- Port Mirroring
- Jumbo Frame Support (10 kB)
- Fast Boot

S-A6640
Ethernet Switch for Space Payloads, Satellites, etc.

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Learn more

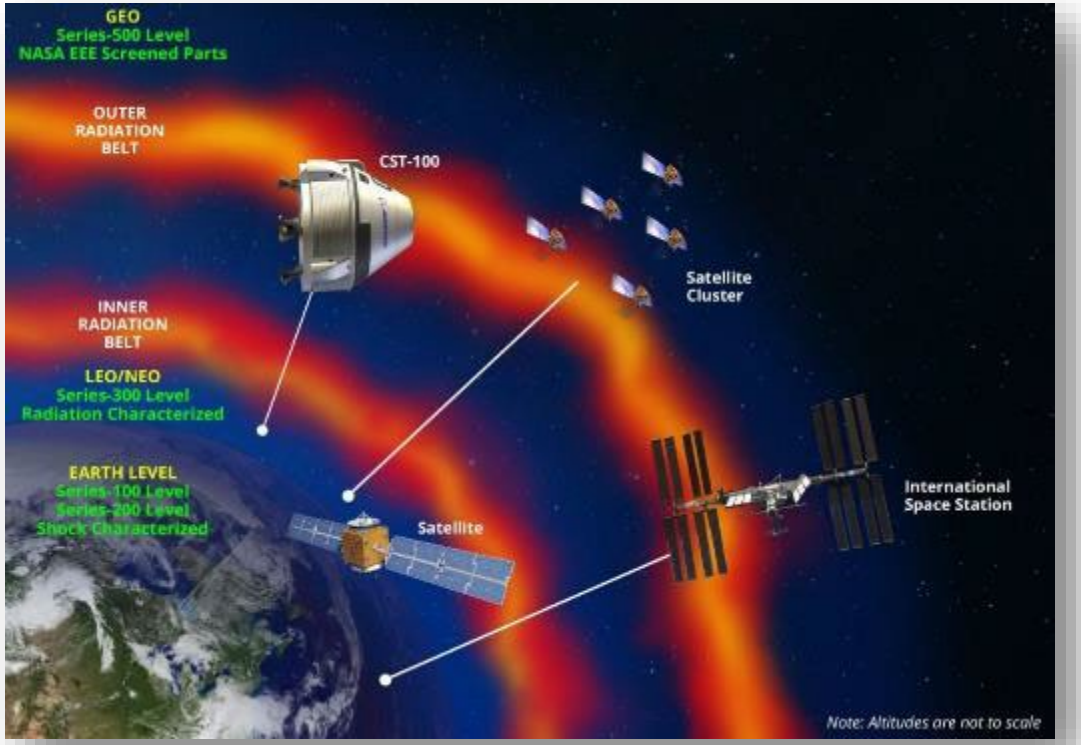
References

- White Paper: COTS in Space: from novelty to necessity
  https://aitechsystems.com/cots-in-space-novelty-to-necessity/
- Available Space Solutions:
  https://aitechsystems.com/space-brochure/
- Callisto Technology Demonstration to Fly Aboard Orion for Artemis I
  https://www.nasa.gov/feature/callisto-technology-demonstration-to-fly-aboard-orion-for-artemis-i
- Low-Earth Orbit Flight Test of an Inflatable Decelerator (LOFTID):
  https://www.nasa.gov/mission_pages/tdm/loftid/index.html
- OSIRIS-Rex:
  https://www.nasa.gov/osiris-rex

We Provide

Solutions for Space

- Four decades designing and manufacturing rugged computing products for harsh space environments
- Pioneer in launch of VMEbus products for defense and aerospace industries
- Leading today's Space 2.0 innovations: GPGPU, Connectivity, Digital Backbone



- Radiation tolerant and hardened solutions from boards to integrated systems and subsystems
- In-house design and manufacturing; global customer support

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Thank you for joining us!

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