

# The Transformation of Ground Stations:

*New Technology on the Rise*



*Sean Casey*  
*VP of Commercial Business Dev*

*Mike Carey*  
*Founder & Chief Strategy Officer*

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Your business vision is  
an unseen reality

Startup search for a  
business model

Assumption about

- Market risk
- Technology risk

Excited for here & now

# Problem Statement: The Data Bottleneck



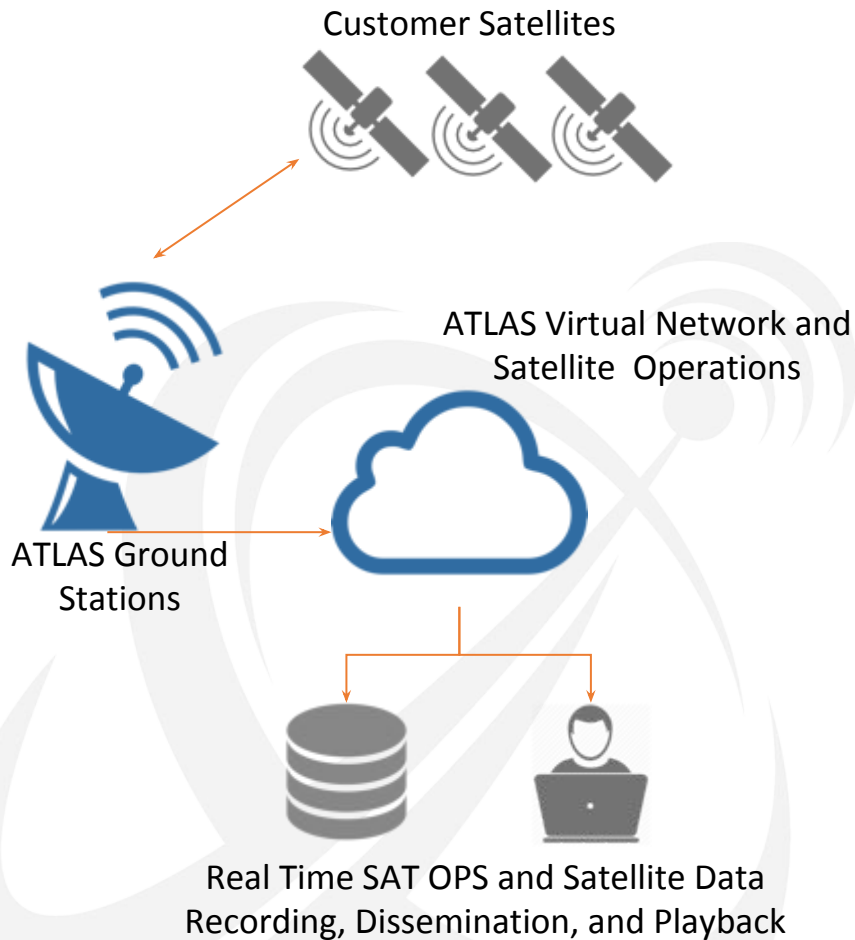
## Existing Networks

- Contain outdated, legacy hardware
- Are limited in bandwidth
- Lack software
- Are not automated
- Are prone to failure
- Require human operators

*Not only are existing networks costly to maintain and to operate, they can't keep up.*

*This is the "data bottleneck."*





ATLAS Space Operations, Inc. is a state-of-the-art satellite data communications company that leads the industry in providing customers with the highest quality of service and the most cost-effective solutions, bar none.

*The Future Is Now*

# Revolutionary Product Offering

Freedom™ Software Platform



Reach™  
Launch Support

Freedom™ Network

Links™  
Electronically Steerable Arrays





# Global Antenna Network



Operational & Landbanked Sites 2019/2020  
Freq: UHF, S-, X-, and Ku/Ka-band

# Freedom™ Software Platform

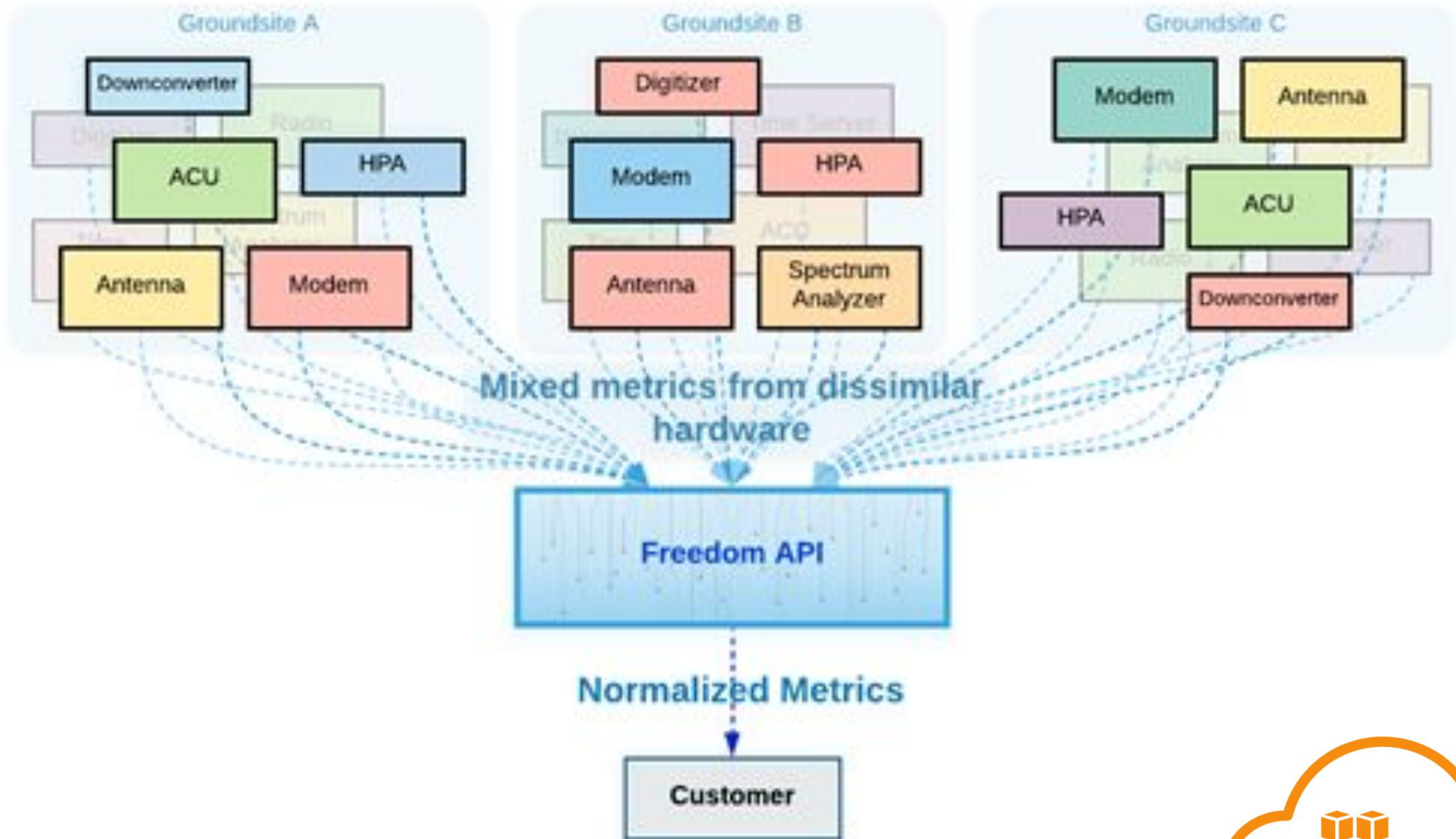
- Freedom creates a software-centric cloud based network that is fully automated.
- Provides an intuitive user interface, flexible scheduling & a single endpoint for all ground site communication,
- Enables network to scale with customer demand.
- Auto configures and manages the ground site hardware and software, before each pass.



*The satcom dream solution is  
now a reality!*

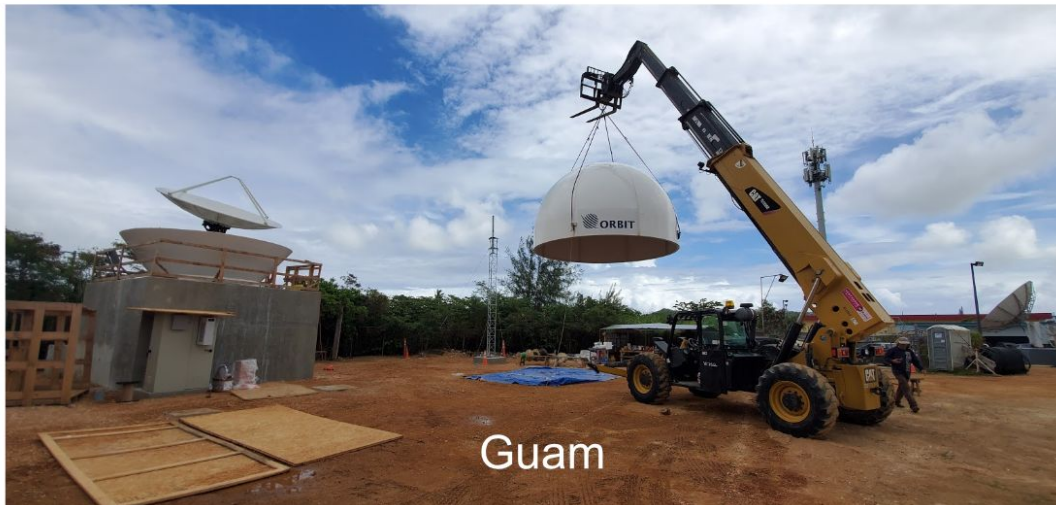


# Freedom API integration with GAS





# ATLAS Landbanked Development



# Global sites for consideration

Location	Lat	Long	Status
<b>US Canada</b>			
Loring, Maine	46.9	-67.8	New Antenna
Nova Scotia	45.421	-63.45	New Antenna
Vernon Valley	41.2	-74.53	New Antenna
<b>Western Australia</b>			
Perth	-31.155	115.919	New Antenna
Mingenew	-29.01	115.342	Existing
Mingenew	-29.01	115.342	New Antenna
<b>Arabian Peninsula</b>			
Manama, Bahrain	26.218	50.57	New Antenna
Dubai, UAE	24.942	55.346	Existing
<b>South Africa</b>			
Hartebeesthoek	-25.909	27.709	Existing
<b>South America</b>			
Cabo Negro, Chile	-52.939	-70.856	New Antenna
Longovilo, Chile	-33.95	-71.4	Existing



**Antenna sites:**  
**Maine (top)**  
**Mingenew (mid)**  
**Dubai (bottom)**



# Mojave, CA - S & X Bands



<b>Antenna SIZE</b>	3.0 m
<b>Antenna TYPE</b>	S-Band & X-Band
<b>Antenna GAIN (Rx)</b>	X-Band: 34.4 dBi
<b>Antenna 3 dB BEAM WIDTH</b>	Half-power at X-Band: 0.829°
<b>POLARIZATION</b>	RHCP/LHCP Switchable
<b>MINIMUM ELEVATION ANGLE</b>	5° (assumed)
<b>AZIMUTH RANGE</b>	0 - 360° (assumed)
<b>SITE ELEVATION ABOVE <math>\mu</math> SEA LEVEL</b>	845.0 m
<b>ANTENNA HEIGHT ABOVE TERRAIN</b>	3.0 m
<b>INTERNET DOWN/UPLOAD</b>	100/100 Mbps
<b>MODEM</b>	Amergint SatTRAC
<b>MODULATION (Circle as appropriate)</b>	GMSK / BPSK / QPSK / OQPSK

# Brewster, WA - S & X Band



Existing 7.6-meter antennas:  
Developed by NEC for ICO  
(Brewster, WA site)

<b>Antenna SIZE</b>	7.6 m
<b>Antenna TYPE</b>	S-Band & X-Band & UHF-Band
<b>Antenna GAIN (Rx)</b>	S-Band: 36.1 dBi X-Band: 54.0 dBi
<b>Antenna 3 dB BEAM WIDTH</b>	S-Band: 1.339° X-Band: 0.320°
<b>POLARIZATION</b>	R/LHCP
<b>MINIMUM ELEVATION ANGLE</b>	5°
<b>AZIMUTH RANGE</b>	0 - 360° (assumed)
<b>SITE ELEVATION ABOVE μ SEA LEVEL</b>	1246 ft
<b>ANTENNA HEIGHT ABOVE TERRAIN</b>	11.9 m
<b>INTERNET DOWN/UPLOAD</b>	100/100 Mbps
<b>MODEM</b>	TBD
<b>MODULATION (Circle as appropriate)</b>	GMSK / BPSK / QPSK / OQPSK

# ATLAS Around the World

***“Actively working with customers for ground station development based upon mission requirements.”***



Sodankylä, Finland



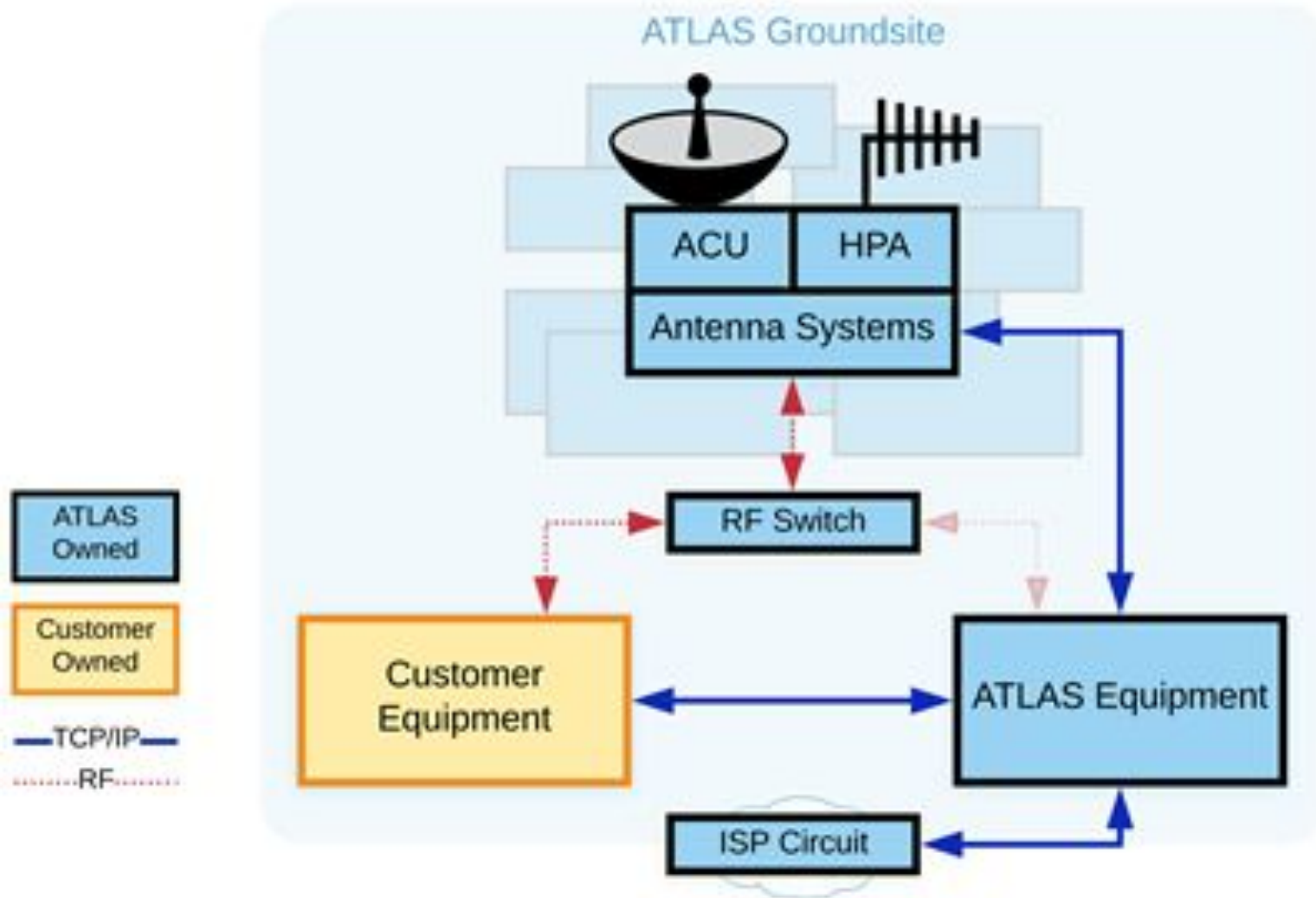
Sunyani, Ghana



Invercargill, New Zealand



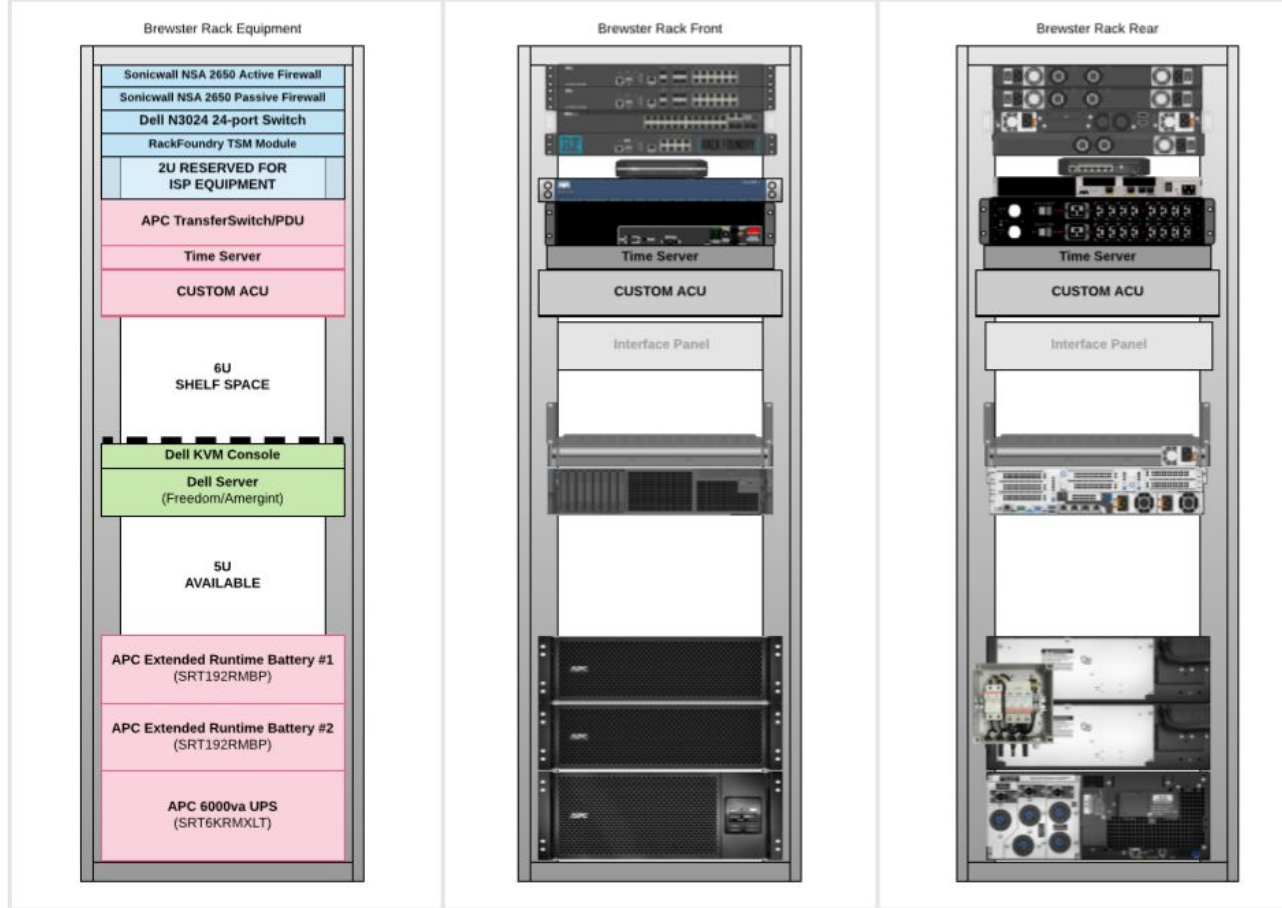
# Typical customer installation



# Typical ATLAS Rack Installation

## ATLAS – BREWSTER RACK DIAGRAM

05/31/2018 – REV1.2 – ADALKOS



Mojave Rack Install

*ATLAS = A diverse and global team delivering  
~~More~~ YOUR data... Faster!*



- Satisfied ATLAS customers:
  - USAF, NOAA, NASA
  - SSLoral, BlackSkyGlobal
- '18 Company growth > 100%
- 3X Operating capacity in 18 months on 6 continents

*New Technology, New Thinking*

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**ATLAS**  
SPACE OPERATIONS™

# Reach™ Launch Support

- Powered by Freedom Platform & LINKS
- S-Band downlink entry point for your launch event anywhere on the globe
- Using LINKS™ we're able to provide telemetry and data services in both established and non-traditional locations
- Global launch sites – soon to be in Michigan

*Making launch as easy as 1, 2, 3*





# The ATLAS Solution



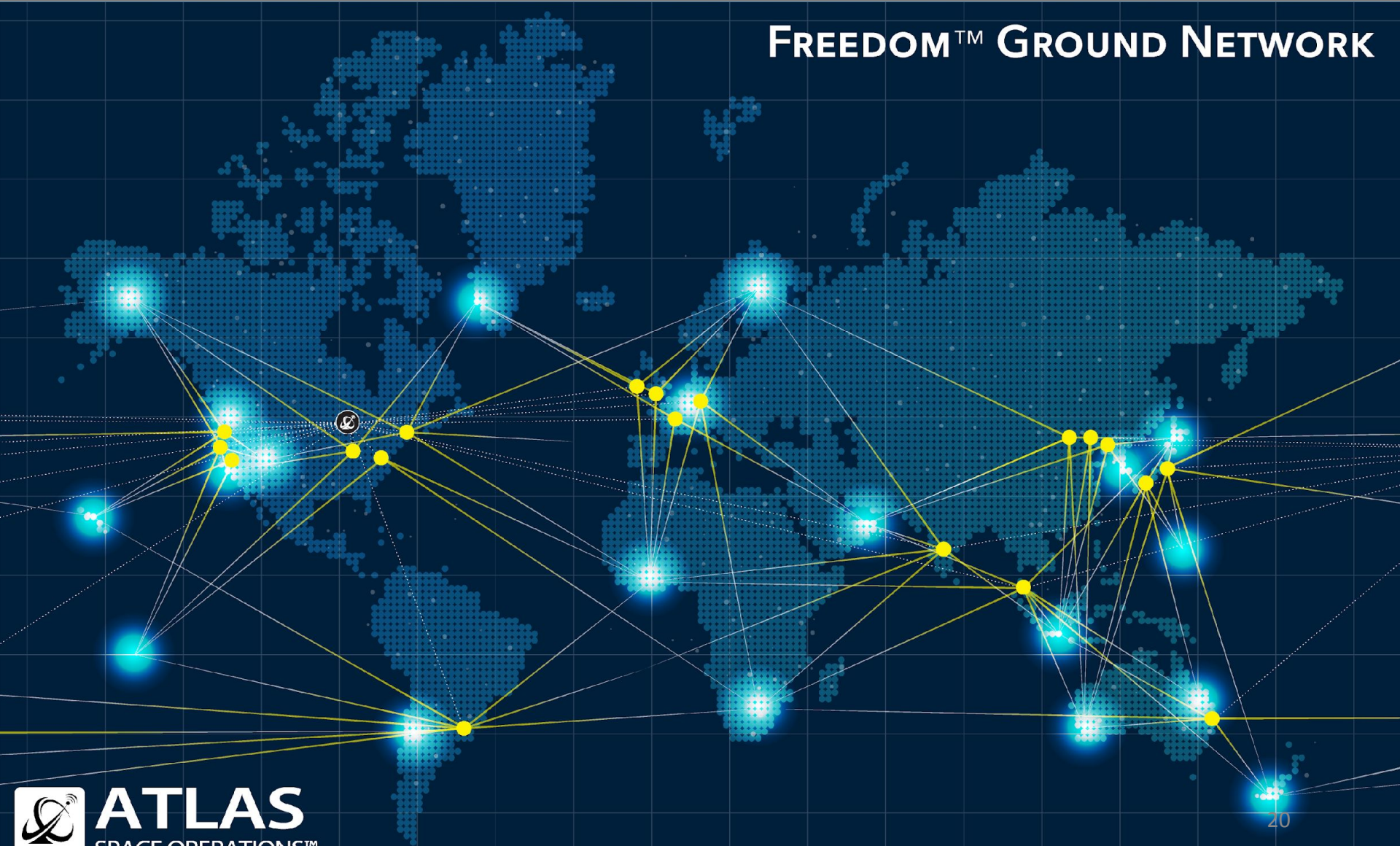
## ATLAS Eliminates the Data Bottleneck

- ATLAS antenna technology provides for multiple satellites to simultaneously connect.
- ATLAS software-centric cloud based network is fully automated.

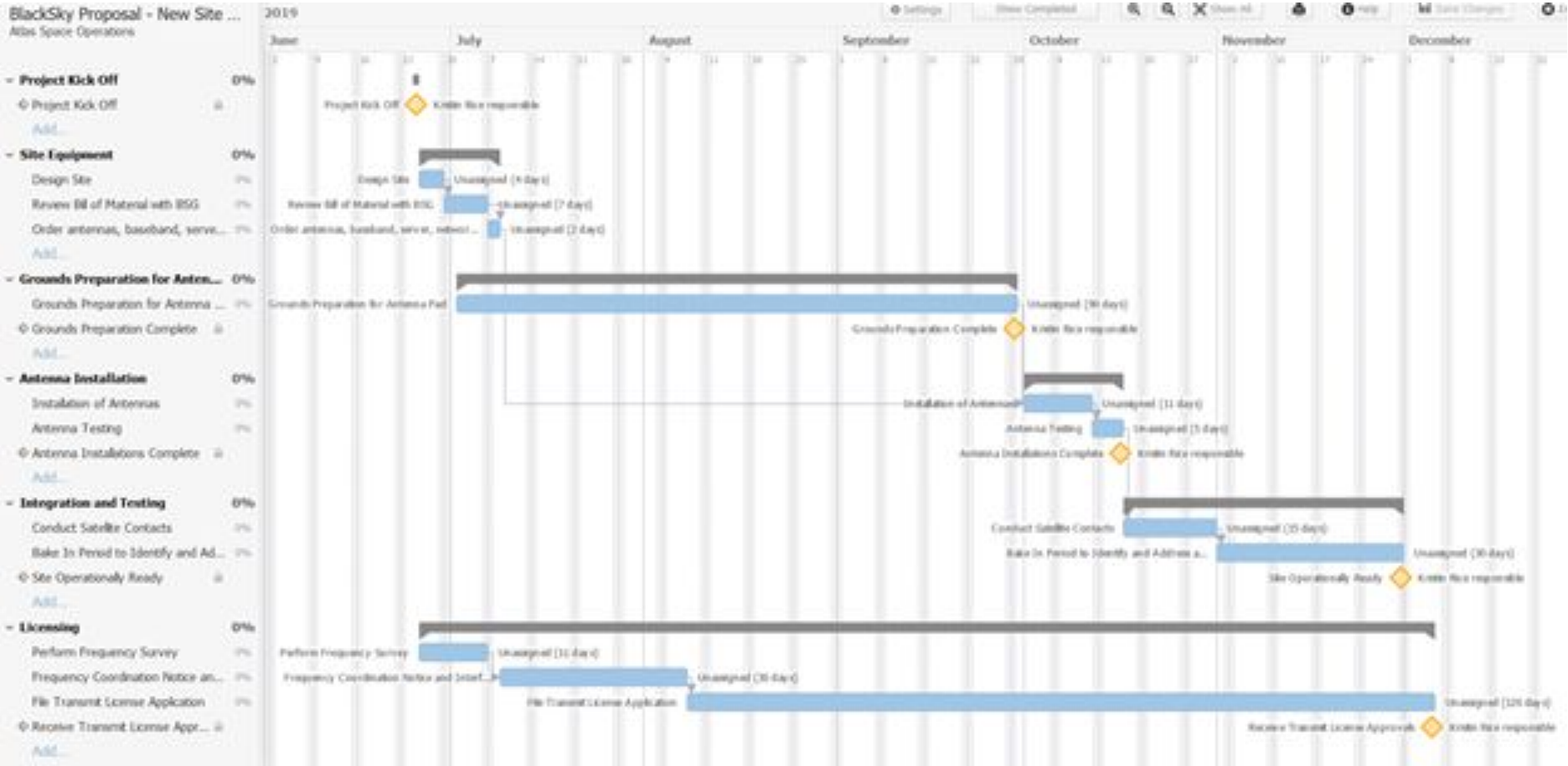
*ATLAS = More data...  
Faster!*

# Global Antenna Network

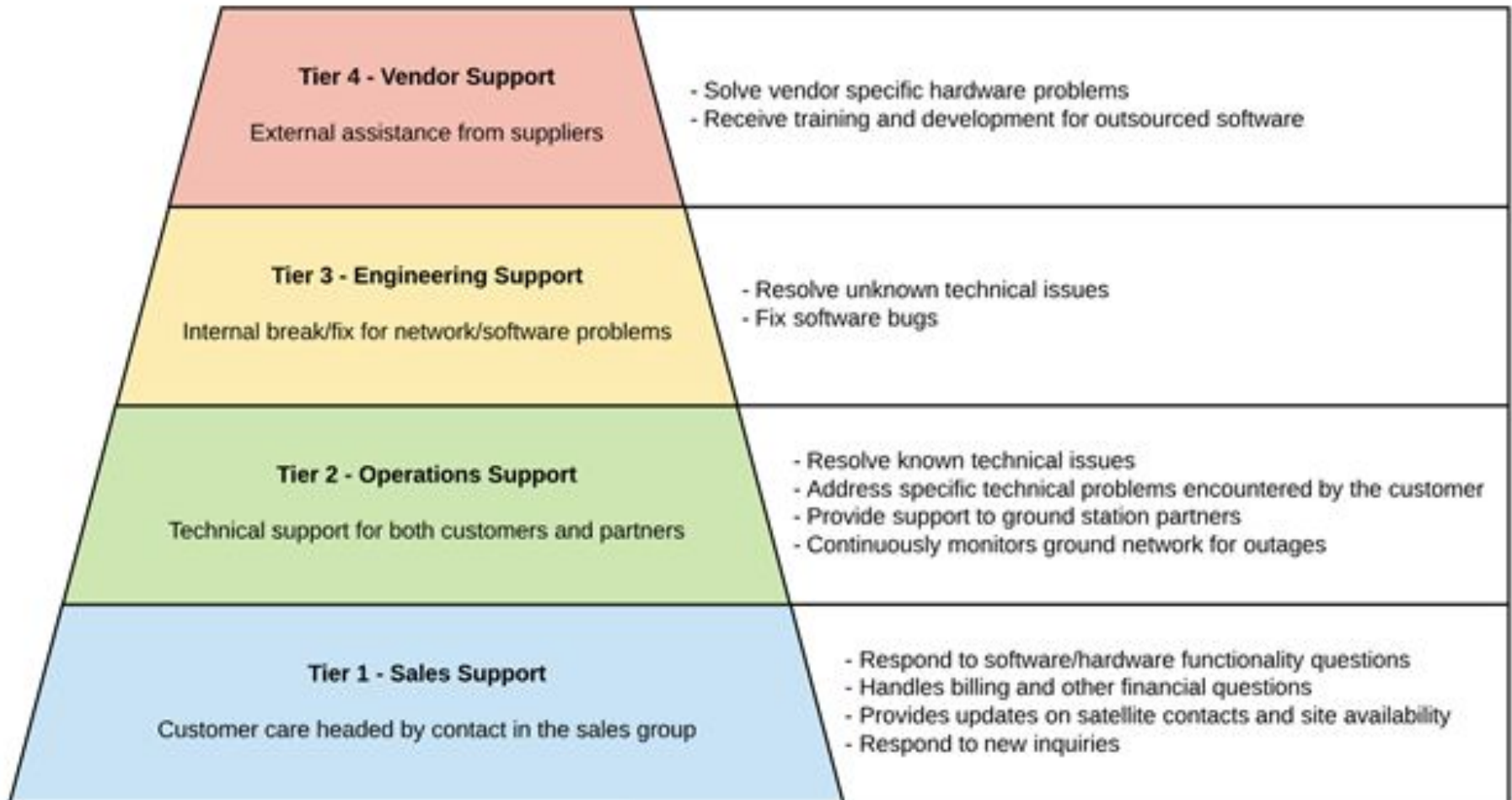
FREEDOM™ GROUND NETWORK



# Landbanked Site Development



# ATLAS-Customer Support





# Links™ Electronically Steered Array

*“Simultaneous connections to multiple LEO satellites”*





# ATLAS The Founders

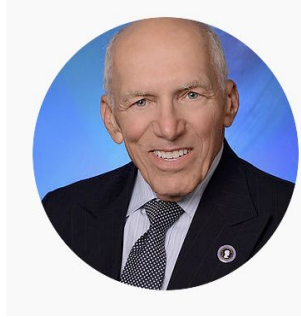
## Sean McDaniel, President & CEO

- Expertise in Space Ground System Development
- 20+ Years in Space System Engineering and Program Management
- MS Aerospace Engineering, BS Mathematics



## Mike Rendine, VP

- 40+ Years Engineering Program/Financial Management in Space and Missile Defense Industry
- Retired USAF COL
- Founder of ASAI, ASAT
- Former VP at Orbital Sciences
- MS Industrial Engineering, BS Mechanical Engineering



## Mike Carey, CSO

35+ years relevant experience in satellite and space operations

- Retired USAF Maj General
- Former Space Wing and Test Group Commander
- MA National Security and Strategic Studies, Master of Public Administration



## Brad Bode, CTO

- 18+ Expertise in Space Ground System, SW Development, Small Satellite ground Architecture Development & Mission Planning Applications
- MS Computer Science

