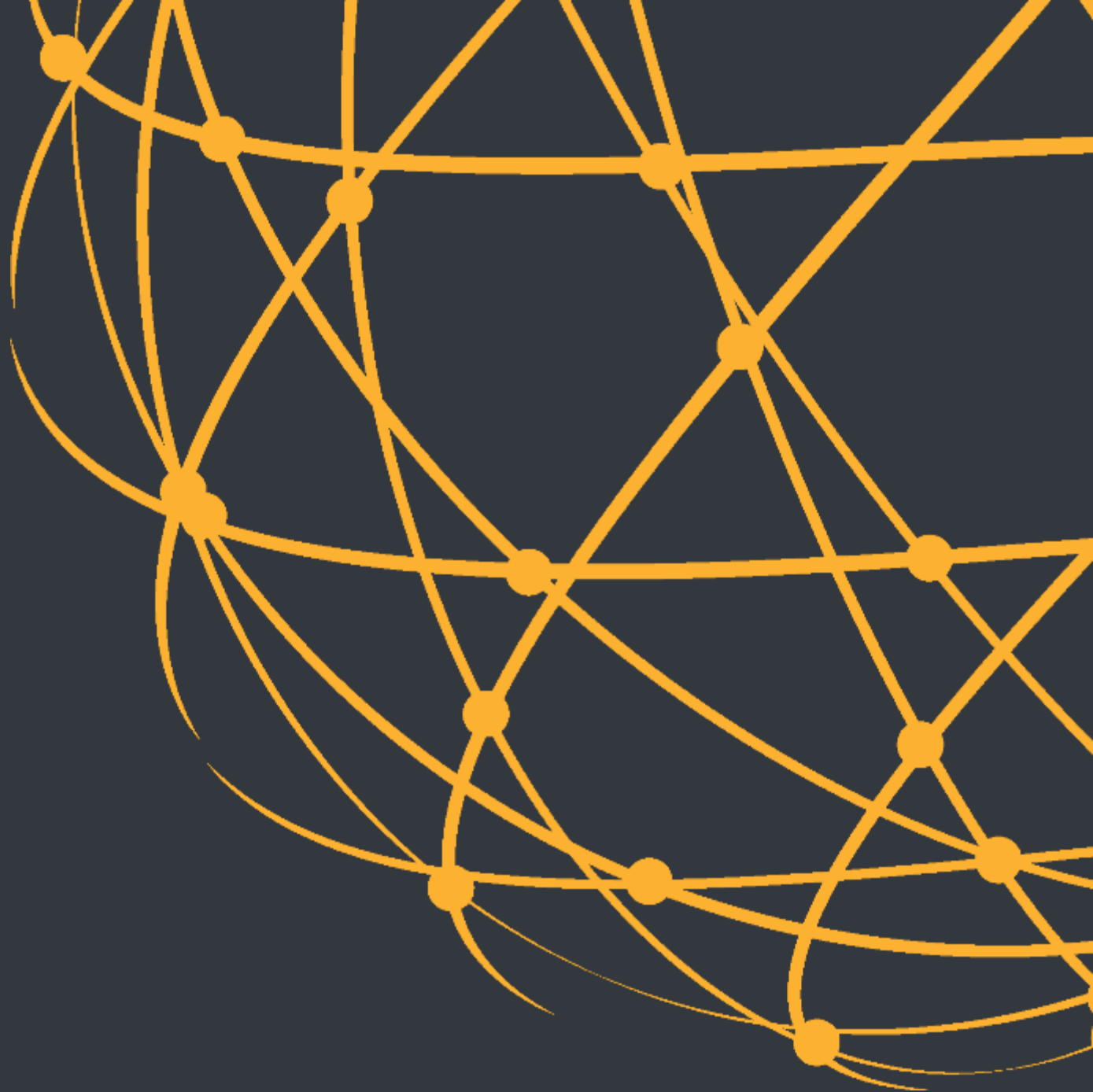


Iridium, IoT and Converged Communications

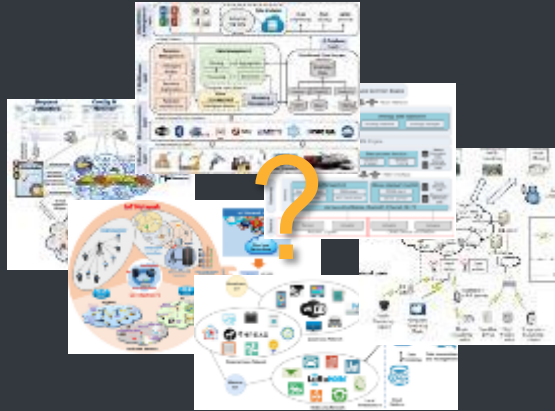
Tim Last, VP&GM Americas

October 2022





What is the Internet of Things (IoT)?



The Simple Answer

- Internet of Things is about connecting devices and machines to other devices and machines, or to people
- The goal is to enable organizations to be more effective, productive, profitable or provide better service
- Things can be:
 - Moving or in one place
 - Located anywhere in the world
 - Disadvantaged (connectivity, power, environment)
 - Highly cost sensitive
 - Mission critical
- Satellite is often the best and sometimes the only way to connect the Internet of Things



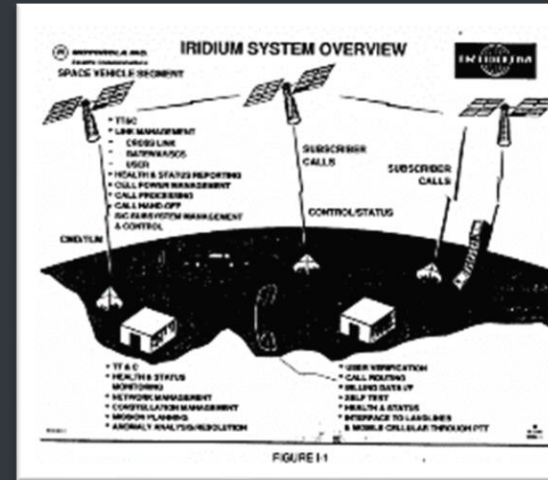


Some Iridium History

1987
- 1998

AN AMAZING DECADE

- Over \$6 billion spent!
- 13 International Partners
- Over 95 satellites built (a first in the industry!)
- IPO on NYSE before service ever began
- 19 launches across 3 countries in 1 year!



Press Release

THE WORLD'S FIRST GLOBAL SATELLITE TELEPHONE AND PAGING COMPANY STARTS SERVICE TODAY

Iridium Users in New Era of Global Communication

WASHINGTON, November 1, 1998 - The global village just got a whole lot smaller. Iridium LLC today announced that the world's first hand-held, global satellite phone and paging system is now commercially available to customers. With Iridium phones and pagers, people will have the ability to communicate virtually anywhere on the face of the planet - using one phone, with one phone number, receiving one monthly phone bill.

"After 11 years of hard work, we are proud to announce that we are open for business," said Edward F. Stoklos, Iridium LLC Vice Chairman and CEO. "Iridium will open up the world of business, commerce, disaster relief and humanitarian assistance with our first-of-its-kind global communications service."

Iridium "2.0": The Last 20 Years

2000 Emerged from bankruptcy

2003 Turned cash flow positive

2006 Matt Desch joined as CEO

2009 Went public on NASDAQ (IRDM)

2010 Completing financing and began development of Iridium NEXT program

2017 First of eight SpaceX launches was successful

2019 Iridium® NEXT mission was completed and Iridium Certus® broadband launched

2022 Approaching 2 million users, record revenue and earnings





The Iridium Network

66 Active Satellites

- 6 orbital planes with 11 satellites each
- Plus 9 in-orbit spares
- Plus 6 ground spares (launching 5 in 2023)

Low-Earth Orbit (LEO)

- Access anywhere / Real Time
- 100 minutes to circle the Earth

L-band Access

- Allows for transmissions even in adverse weather conditions

Satellite Crosslinks

- Creates low-latency, resilient, high-quality connections





A Typical Week



Iridium®
Voice Call



IOT Data
Transmission



Iridium Maritime Data
Traffic



Iridium Certus®
Session



Satellite Orbits

COMPARING ORBITS

Table of main characteristics

	GEO (36,000km)	MEO (5,000-20,000km)	LEO (500-1,200km)
Altitude latency ¹	High	Low	Very low
Earth coverage	Very large	Large	Small
Satellites required	Three	Six	Hundreds
Data gateways	Few fixed	Regional flexible	Local numerous
Antenna speed	Stationary	1-hour slow tracking	10-minute fast tracking

Advantages	High throughput (HTS) technologies enable basic broadband internet applications	Proven low latency comparable to terrestrial networks, offers fibre-equivalent performance	Claims support for high-frequency trading, virtual gaming, and high-performance computing applications
	Fewer satellites over very large fixed geographical areas	Simple equatorial orbit covers 96% of global population	Smaller, lower power satellites batch-launched more cheaply than GEO
Disadvantages	High altitude and distant ground networking impacts latency-sensitive applications	Dual tracking antennas required to maintain continuous connectivity	Very complex tracking and ground network, plus complete constellation must be in place before service starts
	Signal power losses require larger satellites and antennas	Inclined plane orbits needed to cover high latitudes	Unproven business model, risky technology, and space debris risk

Iridium (780km)
Very low
Large (2800 km)
66
1 or more gateways
Fully mobile

Mobile, personal, highly reliable, battery powered, IoT
Global
Lower bandwidth services
Proven business model, proven technology proven operations



Global LEO can be ideal for IoT

- Mobile
- Low power / battery
- Low latency
- Very reliable
- Small antenna
- Two-way
- Highly scalable
- Low cost



Satellite Spectrum

UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

AERONAUTICAL MOBILE	INTER-SATELLITE	RADIO ASTRONOMY
AERONAUTICAL MOBILE SATELLITE	LAND MOBILE	RADIO DETERMINATION SATELLITE
AERONAUTICAL NONCOMMUNICATION	LAND MOBILE SATELLITE	RADIO LOCATION
WATER	MARITIME MOBILE	RADIO LOCATION SATELLITE
WATER SATELLITE	MARITIME MOBILE SATELLITE	RADIO NAVIGATION
BROADCASTING	MARITIME NONCOMMUNICATION	RADIO NAVIGATION SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL	SPACE OPERATION
EARTH EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE
FIXED SATELLITE	MOBILE SATELLITE	

ACTIVITY CODE

GOVERNMENT EXCLUSIVE	GOVERNMENT/GOVERNMENT SHARES
NON-GOVERNMENT EXCLUSIVE	

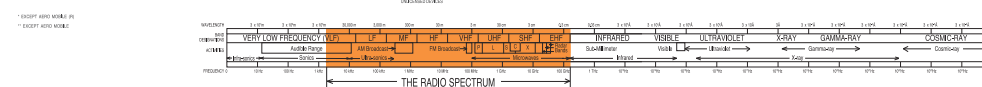
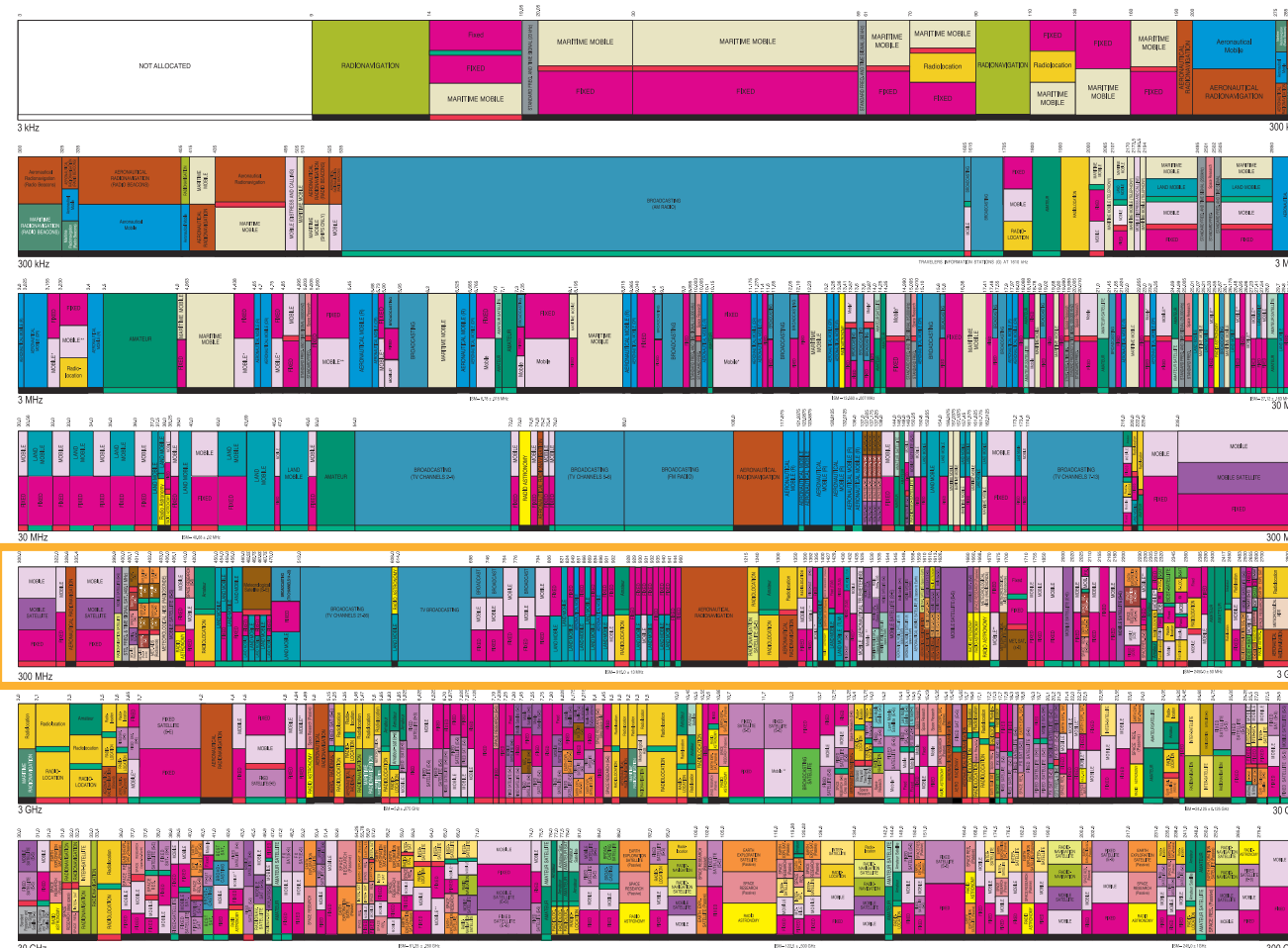
ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capital Letters
Secondary	Mobile	1st Capital with lower case letters

This chart is a graphic representation of the Table of Frequency Allocations used by the FCC and NTIA. It is not a complete listing of all frequencies, but it shows the general allocation of frequencies to various services. The Table of Frequency Allocations is the official source of information on the allocation of frequencies in the United States.



U.S. DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Office of Spectrum Management
October 2003



PLEASE NOTE: THE SPACING IS LISTED IN THE FREQUENCY ALLOCATION TABLE. THE ACTUAL AMOUNT OF SPECTRUM AVAILABLE IS PROPORTIONAL TO THE ACTUAL AMOUNT OF SPECTRUM AVAILABLE.

Terrestrial Options

- Cellular (telematics)
- Unlicensed (utilities)

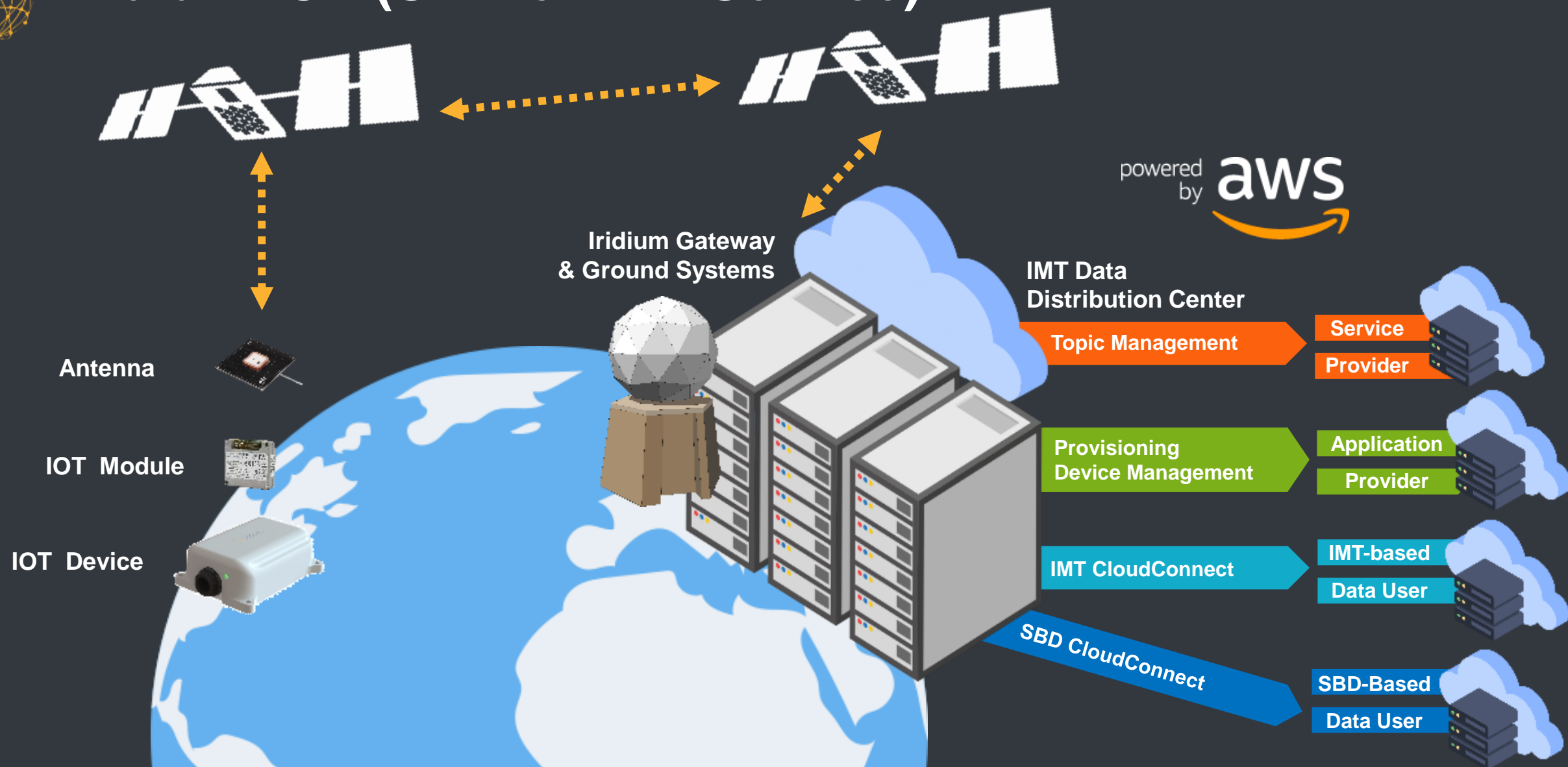
Typical Satellite IoT Bands

- UHF (300-1000 MHz)
- L-band (1-2 GHz)
- S-band (2-3 GHz)

Iridium global L-band (1610 MHz)



Iridium IOT (SBD or IMT Service)





IoT Service Classes / Devices

SERVICE CLASS	CORE TECHNOLOGY	SERVICES	ENABLED DEVICES
Iridium Narrowband (Up to 2.4 Kbps)		<ul style="list-style-type: none">▪ Voice Communications▪ Short Burst Data® (SBD®)▪ Circuit-Switched Data (2.4 Kbps)	
Iridium Certus® Midband (Up to 88 Kbps)		<ul style="list-style-type: none">▪ High Quality Voice▪ IP Data (up to 88 Kbps)▪ Iridium Messaging Transport SM	
Iridium Certus® Broadband (Up to 704 Kbps)		<ul style="list-style-type: none">▪ IP Data up to 704 Kbps▪ High Quality Voice▪ Secondary Data Flows▪ Safety Services	



Enterprise and Government IoT



Remote Monitoring



Asset Tracking



Worker Safety



Cockpit Communication



Global GPS Tracking



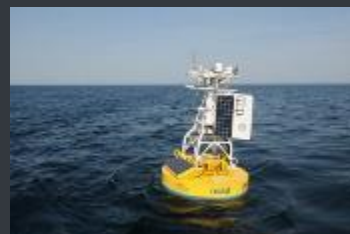
Flight Safety Services



Asset Tracking



Vessel Monitoring



Tracking Buoys



Fishing Vessel Compliance



Sail Drones



Oceanographic / Research



LRIT Compliance



Personnel Tracking



Precision Farming



Pump Monitoring



Equipment Telematics



Vehicle Security



Logistics Tracking



Worker Safety



Secure Communications



Compressor Monitoring



Flow Monitoring



Asset Tracking



Cathodic Protection



Turbine Monitoring

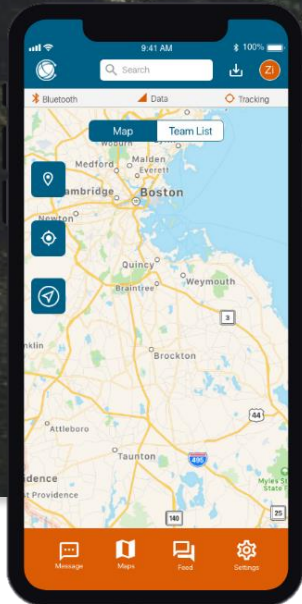


Vaccine Delivery



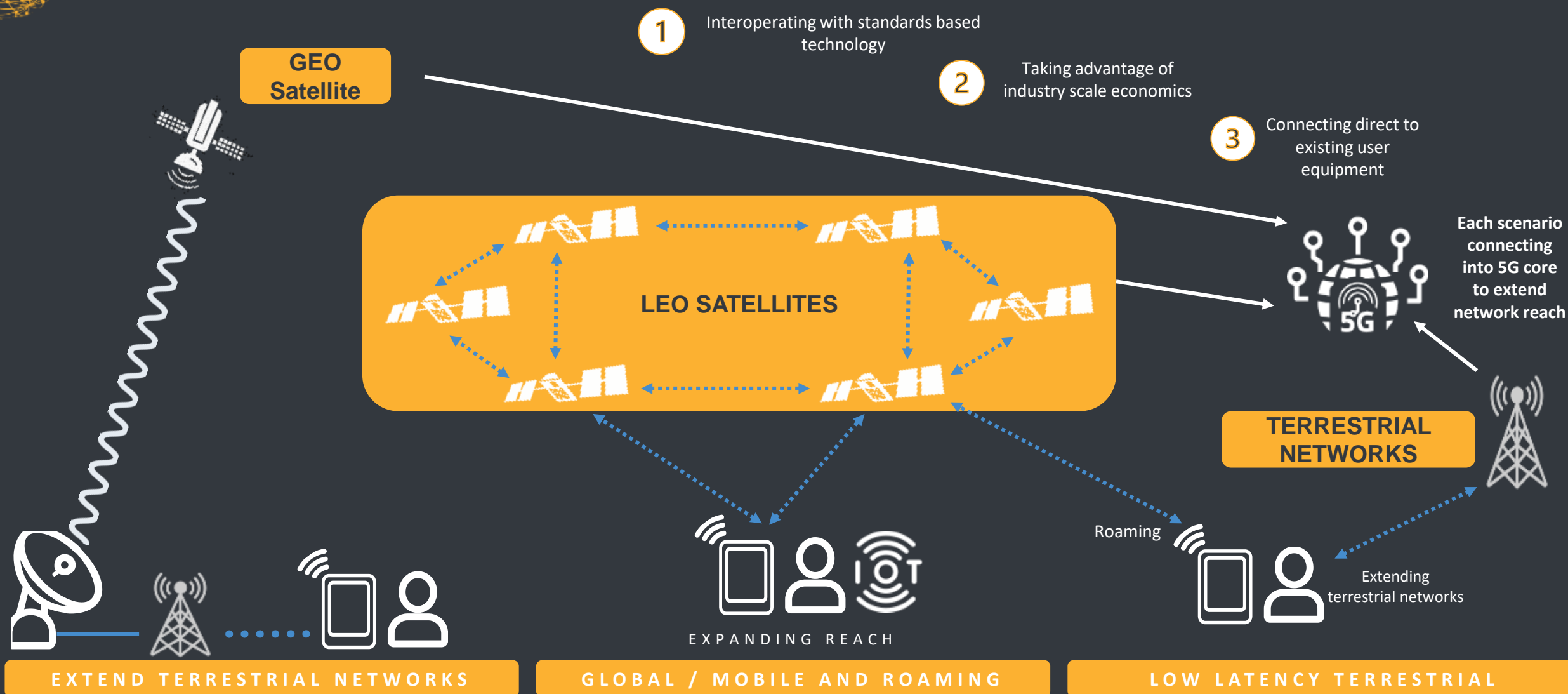
Positive Train Control

Iridium® is the Leader in Satellite-based Global Personal Communications!





Iridium – coming to a Smartphone / IOT device soon





IoT is Everywhere



Heavy Equipment



Personal Users



Fleet Management



Scientific



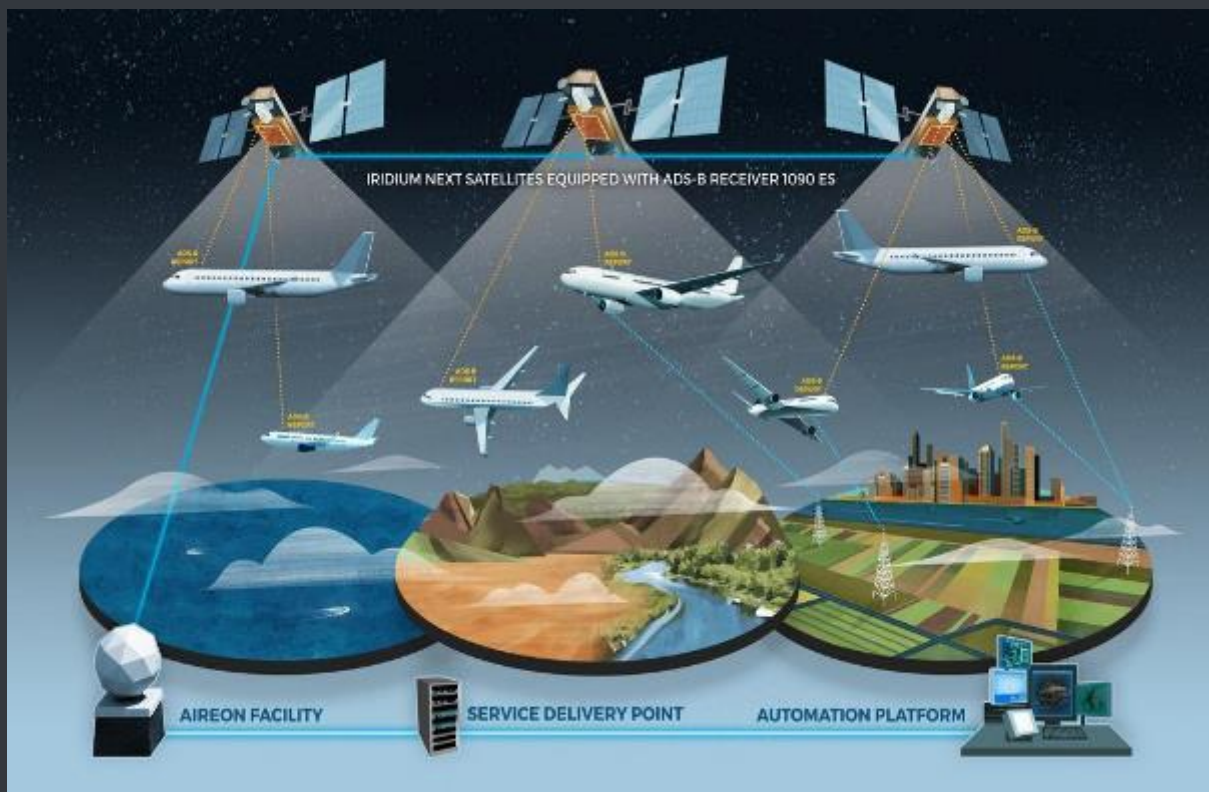
Fishing Vessels



Pipeline Monitoring



Aireon – Aviation IoT





Summing It Up

- There are hundreds of IoT use cases
 - Logistics, safety, research, navigation, monitoring, manufacturing, farming, energy extraction, fishing, tracking, defense, etc.
- The challenge is the right connectivity
 - Availability, cost, reliability, coverage, latency, ease of deployment, size/weight/power, support
- Terrestrial connectivity first choice option
 - When available and reliable – although cellular covers only ~ 30% of landmass reliably
- L-band connectivity from LEO satellites is ideal for many applications
 - Consistently reliable service and wide geographic reach
- Convergence is happening now
 - Available today but at higher cost (multiple devices) – in future lower cost convergence will accelerate with adoption of more standards-based technology
- More IoT use cases will be enabled with technology at the edge
 - Compute, memory, cameras, video engines, sensors, controls, automation, analytics, AI

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