



The Future is Here:

## Next-Generation Land Mobility Networks

Explore how key industries are evolving and what solutions will drive innovation forward



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## "The network is the computer"

- John Gage,  
Sun Microsystems  
(c1980s)

This quote from internet pioneer John Gage reflects the belief that the decentralization array of computing is much more significant than the existence of any one computer by itself. Today, we know this principle as the **"network effect"**. In modern terms, it asserts that the **value of a network is directly proportional to the square of the number of nodes (or "devices") connected to it**.

# O1 The Catalyst for High-throughput Satellite Networks

Given today's staggering number of communication network types, protocols and devices that fuel our world's digital transformation, the "network effect" mentioned above remains incredibly relevant. Achieving seamless data orchestration is a daunting task to say the least. Everything from sensors and antennas to machines and ground stations must interact continuously, at unimaginable speeds.

Industries from mining and rail to oil and gas, first responders and humanitarian aid rely on a wide array of communications network configurations to keep operations flowing reliably wherever their operations take them. Whether at headquarters, a remote outpost, or on the move in a temporarily fixed location, these operations are increasingly dependent on complex applications that require resilient, high-performing network access.

Below we dive into connectivity-related trends and challenges. To gain a deeper understanding, **Intelsat partnered with Harbor Research to conduct a global survey targeting key land mobility markets**. Insights into end user pain points, requirements and priorities for networking solutions are explored here.

# 02

## Connectivity-related Trends and Challenges

Land Mobility industries are **looking to invest in:**

**52%**

Cloud  
infrastructure

**47%**

Higher performing  
network

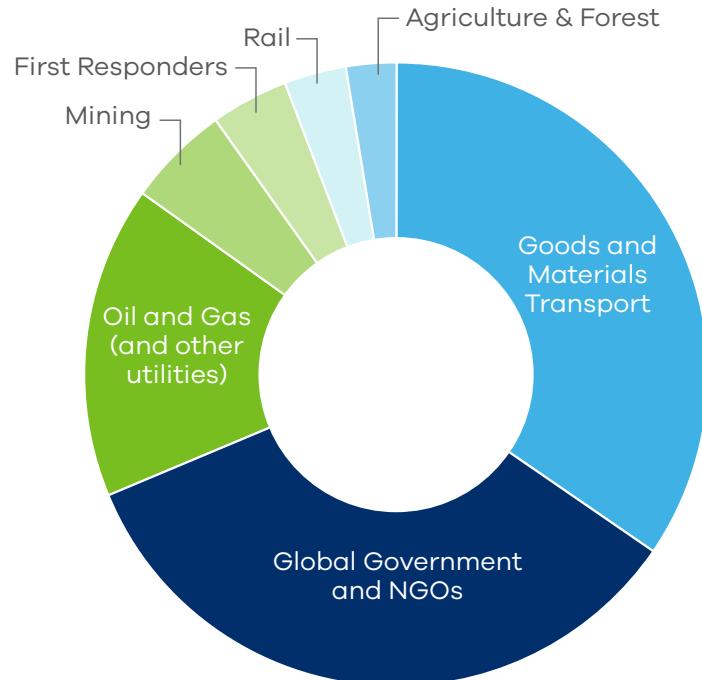
**39%**

Big data and  
analytics

From boosting operational efficiency to safeguarding employees and monitoring assets, **Land Mobility industries worldwide believe updating their connectivity networks will propel industry innovation.**

### Land Mobile Survey Respondents by Market

(N=346)





Among respondents in the Harbor Research Land Mobility survey, **"integrating new technology with legacy infrastructure"** was cited as the most important operational challenge.

**73% of respondents** said their company would be willing to invest in a continuous, ubiquitous connectivity solution.

When asked what technologies are being invested in, survey results show **high-performance networks (i.e. 5G, Private LTE and High-throughput Satellite) are the 2<sup>nd</sup> most important priority behind cloud computing.**

## Narrowband Services Are Available, But May Not be the Answer

To fill terrestrial network connectivity gaps, many organizations consider low data rate satellite options such as BGAN and other Mobile Satellite Services (MSS). Unfortunately, these legacy services can only deliver speeds in the Kbps – barely enough bandwidth for voice and simple messaging applications.

**Limited service flexibility can hinder scalability when location, logistics, or mission objectives change.** Another potential barrier with traditional MSS solutions is that they often come with a high price tag and "use it or lose it" fixed service terms which isn't ideal for operations in temporary sites or for teams that deploy to a location unexpectedly.

**40% of respondents** consider the ability to meet rising bandwidth requirements to be one of their top 3 most important networking needs.



## High-performing Networks: No Longer a Nice to Have

To optimize performance, organizations must overcome the complexity of integrating, managing and maintaining several disparate systems and parallel networks. And they need to determine how to harmonize it all so services and applications are reliably delivered with a positive user experience.

**Most networks are not prepared to handle the oceans of data generated by the tools, sensors, machines and smart devices organizations use today.** It must be able to capture, store, secure and make insightful data available whenever and wherever – without interruption.

# 03 The "Network of Networks" Solution

## Always-available Communications Powered by Broadband Connectivity

Thanks to recent terminal form factor innovations, it's now more feasible and cost-effective for organizations to set up operations in hard-to-reach locations, run cloud-based applications, and use robust satellite solutions. Leveraging a "network of networks", high-speed satellite solution (with Mbps speeds) ensures every device, access point, and location in your network stays secure and seamlessly connected.

### Easy-to-deploy, high-speed connectivity on-the-go



#### Communications-on-the-Move (COTM)

Uses a vehicle-mounted satellite antenna that automatically acquires a connection and maintains communication while the vehicle is moving.



#### Communications-on-the-Pause (COTP)

Uses a highly compact and portable satellite terminal with an automatic or assisted pointing function to connect to a satellite, designed for temporary use in a fixed location.



When high-throughput satellite (HTS) connectivity is utilized in conjunction with terrestrial wireless services, **end users gain the communication redundancy, flexibility and simplicity necessary to quickly scale operations** where and when they're needed most.

## High-throughput Satellite (HTS) Networks Can Be Used to **Solve On-the-go Connectivity Challenges**

Organizations keen on expanding their communications capabilities to support advanced mobility applications are looking at HTS networks as an extension to their existing connectivity landscape. When existing radio, fiber, and cellular networks cannot meet your data needs, high-speed satellite solutions are a reliable, survivable means of communication. .

HTS networks optimize the way data moves between and among systems, regardless of connectivity type, device, or network. These sophisticated networks combine various standards and protocols seamlessly, forming a "safety-net" of connectivity.



## Top 6 operational challenges for Land Mobility survey respondents:

Integrating new technology with legacy network infrastructure	Lack of existing and/or sufficient network infrastructure	Worker safety compliance	Securing sites and assets	Asset monitoring and equipment/operational downtime	Automating Operations
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# 04

# Applications Challenges and Solutions: A Deeper Dive by Industry



## Mining

Mining companies worldwide are looking to create a more intelligent mining environment that reduces costs as well as environment impact. Roadblocks range from volatile commodity prices and decreasing ore grades to changing demographics and perceptions of mining as a career choice. However, this resilient industry is keen on adopting technologies that lead to greater efficiency and sustainability.

### Challenges

There is growing demand for solutions that remove mining operators from dangerous situations. Remote and autonomous vehicles answer this need, but they require significant bandwidth to be effective.

Mining operators know that connecting data and insights from mines to mills and distribution chains will drive higher productivity. But work sites are often in remote locations that are under-prepared for the network requirements of a "smart" mining operation.

**61% of mining operators**  
surveyed perceive "support  
for remote operations" as the  
biggest motivator for adopting  
a satellite solution



## Mining respondents' most critical communications and connectivity needs

**56%**

Meet rising bandwidth  
requirements

**44%**

Network  
Security

**39%**

Supporting  
rural operations

### What HTS networks enable



**Reduced downtime and  
maintenance**  
through advanced  
asset management



**Complete  
operational  
continuity**  
and visibility



**Data offload**  
for autonomous  
and remote vehicle  
control



**Video streaming**  
for site security  
and worker safety  
compliance

Intelsat FlexMove, a fully managed high-throughput satellite solution complete with easy to deploy terminals and turnkey service management delivers **robust and reliable connectivity that can be set up by any end user to enable constant communication and provide secure, on-the-go broadband internet access.** This solution meets the requirements of trucks/trains moving on or off mine sites while traveling hundreds of miles through unconnected areas.

Additionally, Original Equipment Manufacturers (OEMs) gain enhanced support for autonomous equipment that necessitates independent network connectivity for telematics, software updates and remote control.





# Oil and Gas

Oil and gas companies need continuous connectivity for all locations, including those that are hard-to-reach, often where they explore and extract resources. Inspecting facilities, monitoring leaks, servicing equipment and monitoring workers traveling between locations all require always-on network availability.

## Challenges

Exploration tends to take place in remote and/or harsh environments. Upstream scouting is also in hard-to-reach locations, while monitoring transport vehicles between and among locations has proven to be operation-critical.

**70% of respondents** say "support for remote operations" is one of the top three benefits of satellite connectivity in supporting mobile vehicles and/or temporary site operations. The other two were "network security" and "ease of network setup and management".

## What HTS networks enable



**Continuous broadband connectivity** from site to refinery



**Real-time data capture and analysis** to detect areas of concern



**Operational efficiencies** with advanced IoT applications



**Remote monitoring and security** with HD video streaming to limit accident risk



An ultra-portable Comms-on-the-Move (COTM) terminal or low profile Comms-on-the-Pause (COTP) vehicle-mounted terminal integrated with a reliable HTS network enables teams in remote locations to seamlessly communicate collected site data from disparate operations directly back to headquarters.

Intelsat FlexMove confidently meets the requirements from on-site oil and gas exploration to the trucks and vehicles traveling hundreds of miles through unconnected areas thanks to its fully integrated, end to end managed service which features a variety of preconfigured terminals, flexible service plans, and turnkey management.



# Goods and Materials Transport

The transportation supply chain is undergoing a digital makeover with companies looking to collect data from raw materials flow to the condition and location of finished goods. This data feeds machine learning, AI, and advanced analytics to drive automation and deliver insights across the value chain.

## Challenges

This industry is looking for ways to cut costs, improve visibility and chain of custody transparency, and leverage applications that reduce time-consuming tasks like logistics, planning, and billing.

According to Goods and Materials survey respondents, the top 3 benefits of satellite connectivity for transportation are: **"support for remote operations"**, **"network security"**, and **"ease of network setup and management"**.

**Over 75% of fleet managers** rely on fleet management software or vehicle telematics to help support their day-to-day operations.

## What HTS networks enable



Improved supply chain and logistics visibility



Reduced OPEX with autonomous remote vehicles



Enhanced fleet and asset management for optimal performance



Security, safety and worker compliance with telematic applications



Better customer engagement & satisfaction on package logistics

Top applications Goods and Materials companies would enable using long-range connectivity for vehicles: **video security, streaming, and situational awareness**.

For stretches of the supply chain that go uncovered by cellular networks, **high-throughput satellite solutions can be used to create a "network of networks" that offers continuous connectivity**. Intelsat FlexMove enables Goods and Materials companies to capture and leverage more data across the value chain to facilitate automation, streamline operations and improve overall efficiencies.





# First Responders

First Responders need high-speed communications access in a moment's notice. But delivering continuous connectivity wherever an emergency occurs isn't easy. Especially where terrestrial networks are prone to natural disasters, fiber outages or where cellular networks simply doesn't exist.

## Challenges

Developing technologies such as AI for flames and smoke detection along with innovative mobile applications are coming online to enable first responders to access the information when and where needed is at an all-time high. However, many of these life-saving applications and devices are cloud-dependent and rely on loads of bandwidth that is not always available.

Survey results show First Responders rank "**ability to meet bandwidth requirements**" as the top benefit of satellite (other options were "support for remote operations", "network security" and "ease of network setup and management")

### Top 3 critical networking needs according to First Responder respondents:



Ability to work  
in hazardous  
locations



Network  
security



Optimal  
terminal form  
factor

## What HTS networks enable



**Easy network integration** for enterprise continuity



**Greater network uptime** and reliability



**Advanced sensor technology** for environmental threat assessment



**Decreased response times** with robust tracking and wayfinding



As more data intensive technologies are adopted, First Responders will require a mix of secure, reliable connectivity solutions in rural and heavy urban areas. **Intelsat FlexMove creates a seamless, secure "network of networks" solution** ensuring high-speed connectivity is always accessible and can work in tandem with existing terrestrial networks when they are not available.



# Rail

Manual inspections create millions of hours in asset downtime for rail operations worldwide. Emerging technologies are beginning to integrate into daily operations. For example, drones can be used to fly over radio towers, bridges and tracks to eliminate human assessments while wayside detectors can deliver cost-saving predictive maintenance insights. Rail companies are looking towards advanced applications like these to help keep operations on track.

## Challenges

Mobile testing cars routinely fall through the terrestrial connectivity net, resulting in interrupted data flow and analysis that can impact operational fluidity, cause missed connections and fail to detect dangerous track, car, and locomotive issues.

**73% of Rail respondents** said that they currently (or wish to) enable Fleet/Asset management through connectivity for mobile vehicles and temporary sites. Other use cases include: backhaul for autonomous operations and asset health monitoring.

### Top 3 critical networking needs according to Rail respondents:



Network security



Support for remote operations



Network redundancy and reliability

## What HTS networks enable



**Reliable traffic control and tracking**



**Fewer accidents** through modern situational awareness and site safety



**Autonomous and remote vehicle control** to reduce human intervention and error

Intelsat FlexMove delivers the highest level of network uptime and enable rail companies to avoid disruptions in data collection so operators can track locomotive movements in real-time, decrease downtime, take advantage of predictable maintenance insights and improve operational efficiencies from top-to-bottom.





# Global Government and Non-governmental Organizations

Day-to-day operations, security threats and natural disasters all require mission-critical coordination across different groups. Seamless communication and reliable data transmission across regional, local and international stakeholders is vital for safe and efficient operations but can be a challenge when having to deploy on the fly.

## Challenges

Keeping communications open, secure, and near real-time – whether among human beings or among autonomous machines – is more complex than ever before as our world becomes more digital.

### Top 3 most critical connectivity needs for Government and NGO survey respondents:



Network security



Ease of network setup and management



Ability to meet rising bandwidth requirements

### Top 3 motivators of satellite adoption according to Global Government and NGO survey respondents:



Network security



Support for remote operations



Ease of network setup and management

## What HTS networks enable



Global, secure, high-speed telemedicine applications connect patients in the field to experts



Easy-to-deploy connectivity designed to unify disparate operations



Optimal support and situational awareness for field units

Inadequate bandwidth, reach, and network resiliency can limit an organization's ability to carry out critical operations. Intelsat FlexMove provides the optimal visibility and orchestration for mission-critical decision making and logistics, assisting with the allocation and movement of resources across distributed field activities and improving situational awareness of hazardous environments.





# Media Operations and Organizations

In the fiercely competitive news gathering industry, media organizations must have access to reliable and uninterrupted high-speed IP data connectivity to capture stories anywhere in the world and deliver a high-quality broadcast to viewers. For journalists and broadcast teams in challenging field conditions, mobility and deployment speed are paramount.

## Challenges

Broadcast teams need a reliable, accessible, high-speed IP data connection at a reasonable cost point to broadcast live in hostile and dangerous environments where power grids and cellular services have been compromised or are completely unavailable. Backpack journalists need more than satellite phones to cover breaking news and retain critical connectivity while in the field.



### Top Media Organization Requirements of Satellite Solutions:



Manageable Costs



Portable Equipment



Battery power



Quick Set-Up and Tear-Down



Fast and Easy Access to Network

### What HTS networks enable



**Live Video Streaming from the harshest, most remote field conditions**



**Internet connection** for remote news gathering to file stories on time

**20X**

**IP Data transmission** speeds 20 times faster than competitors



**Uninterrupted Global Access** when cellular service is down, lost, or unreliable



**Lightweight Terminals** that are easy to transport and deploy

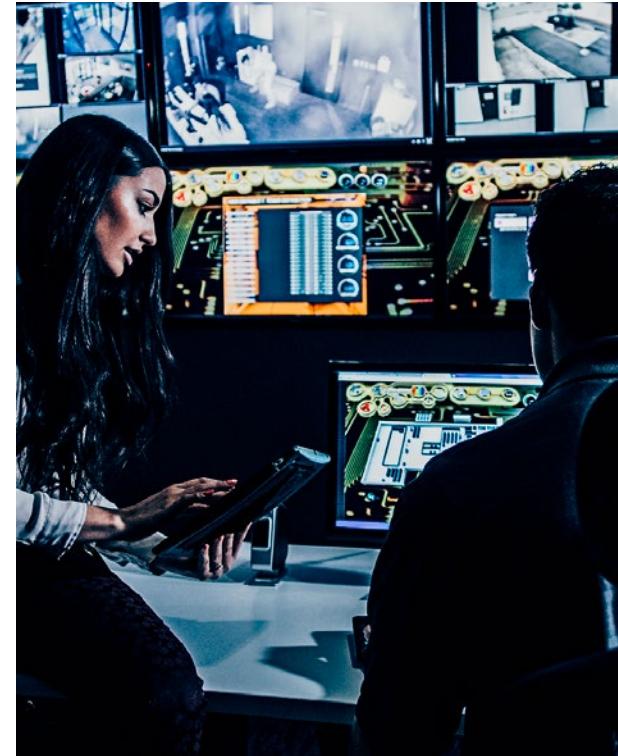
Intelsat FlexMove is a fully managed HTS solution with highly portable terminals that any broadcast team can quickly deploy in the field. FlexMove delivers global, robust, and reliable IP data connectivity, allowing news organizations to stream high-quality live video with low latency or jitter. FlexMove integrates with solutions that blend satellite and cellular connectivity, enabling a seamless transition between connectivity options to best manage usage and costs.

# 05 The Leader in Ubiquitous Satellite Connectivity

As the foundational architects of satellite technology, Intelsat operates the world's largest and most advanced satellite fleet and connectivity infrastructure. With a global fleet of 50+ satellites covering 99% of the Earth's populated regions, we are a trusted provider of high-performance, mission critical connectivity solutions.

At the forefront of space-based innovations, we are committed to the future of mobility. We apply our expertise and global scale to connect people, businesses, and communities, no matter how difficult the challenge.

**Intelsat is the only commercial satellite operator with an independent third-party Service Organization Control 3 (SOC 3) cybersecurity accreditation – ensuring that its global satellite and terrestrial network is protected against unauthorized access, use or modification.**



## Intelsat FlexMove

Intelsat FlexMove is the first HTS solution for Land Mobility users and enables robust, reliable internet access via public internet or private IP connection to support access to a private network for users in remote, hostile, emergency or temporary locations.

## Satellite Connectivity Made Easy

With "difficulty of network setup and management" cited as a top drawback of satellite adoption for Land Mobility organizations surveyed, developing a solution that overcomes this barrier is critical.

**Intelsat's next-generation platform** dynamically manages capacity across its award-winning HTS fleet and offers the world's largest wide-beam satellite constellation.

## Global Reach

FlexMove is a ubiquitous, multi-layered satellite network that can be deployed in any region around the world making it the ideal solution for cloud-based applications, recurring operations, as well as for occasional use or emergency response.

## Service Plan Flexibility

End-users select from a portfolio of industry leading, pre-configured terminals uniquely designed for Land Mobility needs. With data speeds up to 10Mbps for a fraction of the cost when compared to narrowband satellite services, FlexMove is the cost-effective solution users can rely on. Annual, quarterly and monthly service plans are available by the gigabyte (GB) for single terminal and multi/shared terminal use.

## FlexMove Creates a "Network of Networks"

Organizations across the globe are investing in new technologies to improve their operations, keep their workers safe, and create sustainable environments while unlocking new capabilities and cost savings. Intelsat provides a robust, reliable, global high-throughput connectivity backbone that can seamlessly support and unify an entire operation.

However your needs may evolve over time, Intelsat is the engine that can power your connectivity solutions. FlexMove works in harmony with cellular and terrestrial broadband to provide a "safety net of connectivity" or "network of networks" that keeps you confidently connected.

## FlexMove creates the ultimate connectivity safety net



**Connect to bandwidth-hungry applications**  
at speeds up to 20x faster than narrowband satellite solutions



**Confidently rely on a redundant and survivable network** anywhere around the world



**Bring a terminal online and access the internet in minutes** from any location without any in-depth training



**Select from a variety of flexible, cost-effective service plans** designed to meet specific operational needs

# Committed to Service Excellence

Intelsat delivers the network connectivity building blocks that business and government entities can use to create and implement a sustainable future while our solutions partners bring even more value through network set up and management. FlexMove is the hands-off solution you need to keep your operations running at full speed.

## Let's talk

To learn more about how Intelsat can serve your unique mobility needs and create a connectivity "safety net" for your operations, contact us today.

### Learn More

[intelsat.com/contact-us](https://intelsat.com/contact-us)

## Contact Sales

### Africa

+27 11-535-4700  
[sales.africa@intelsat.com](mailto:sales.africa@intelsat.com)

### Asia-Pacific

+65 6572-5450  
[sales.asiapacific@intelsat.com](mailto:sales.asiapacific@intelsat.com)

### Europe

+44 20-3036-6700  
[sales.europe@intelsat.com](mailto:sales.europe@intelsat.com)

### Latin America & Caribbean

+1 305-445-5536  
[sales.lac@intelsat.com](mailto:sales.lac@intelsat.com)

### Middle East & North Africa

+971 4-390-1515  
[sales.mena@intelsat.com](mailto:sales.mena@intelsat.com)

### North America

+1 703-559-6800  
[sales.na@intelsat.com](mailto:sales.na@intelsat.com)



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Research

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[intelsat.com](https://intelsat.com)

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