INTUITION

EXPERIENCE ADVANCED MOBILITY

IN A HYPER-CONNECTED WORLD

iDirect

REDEFINING MOBILITY FOR A DYNAMIC INDUSTRY

In the rapidly evolving satellite communications ecosystem, advanced mobility solutions have become essential in meeting shifting market dynamics and rising user expectations. Customers now demand high-quality, seamless connectivity with service availability comparable to land-based networks. With more devices coming online per user, service providers face the challenge of scaling their operations while maintaining exceptional service quality.

Advanced mobility technology must deliver maximum choice and flexibility for customers through feature-rich capabilities that enable satellite operators and service providers to efficiently manage capacity. Satellite ground systems play a critical role in ensuring seamless and reliable connections for vehicles, vessels, and aircraft on the move. By dynamically managing satellite links, terminal attachments and bandwidth allocation, these systems help guarantee a consistent, high-quality experience for end users, no matter their location.

Moreover, advanced mobility extends beyond traditional GEO applications for land, air, and sea vessels. The emergence of non-geosynchronous orbit (NGSO) constellations introduces new complexities, requiring complementary capabilities to support the faster movement of satellites in orbit. As the industry adapts to these demands, advanced mobility solutions are aligning with evolving market needs, driving innovation and ensuring connectivity remains robust in a dynamic environment.

KEY APPLICATIONS OF ADVANCED MOBILITY

Our *award-winning advanced mobility features and applications* are the reason we are trusted by the majority of global operators and service providers. Our customers rely on iDirect's advanced mobility to meet the most pressing challenges of SATCOM for mobility markets.

Automatic Beam Switching

Automatic beam switching is an iDirect technology that ensures consistent connection by automatically switching among different beams primarily for mobile terminals. It uses industry standard OpenAMIP to determine the terminal's location and robust algorithms to select the best beam based on coverage maps and other criteria. The modem coordinates with the self-pointing antenna to re-point to new beams ensuring continuous coverage for land-mobile, maritime and aeronautical use cases.

Our advanced mobility technology and applications ensure smoother transitions between connections:

- ✓ **Fast Beam Switching:** Optimize every aspect of beam switching from demodulator lock, timing sync to time plan distribution in order to achieve the fastest beam switching.
- ✓ **Make-Before-Break:** When antenna and RF conditions allow, the new link is established before relinquishing the outgoing one to eliminate interruption.
- ✓ **Break-Before-Make:** Utilized when Make-before-break is not possible while leveraging the fast beam switching optimization.
- ✓ **Satellite Switching:** Similar to Break-before-make if satellites connect to same data center.
- ✓ **Batched Beam Switch API:** Command a group of terminals to switch beam or satellite while leaving the detailed orchestration to the system to minimize collision. Critical for satellite hand over.
- ✓ **Domain-Based Automatic Beam Selection:** (see detail below)
- ✓ **Skew Mitigation:** Address the regulatory challenge of flat panel and electronically steered antennas supporting both real skew capable and GPS-only antennas.
- ✓ **Blockage Mitigation:** Coordinate with antenna control unit to avoid switching to satellites that are blocked by other structures.
- ✓ **Antenna Diversity:** Support antenna systems that have diverse reflectors to eliminate blockage.

Domain-Based Automatic Beam Switching

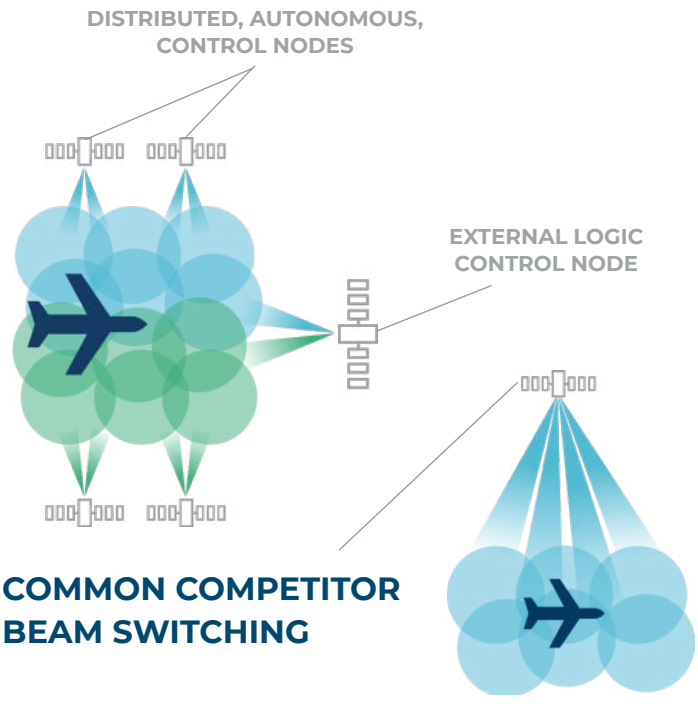
iDirect's newly renamed *Domain-based Automatic Beam Switching* (D-ABS) is a significant innovation designed to enhance connectivity options by enabling seamless integration across multiple orbits and regions, and between legacy and next-generation satellite networks.

A standout feature of D-ABS is its ability to partition satellite beams into customizable "domains." These domains can be tailored based on specific needs—such as orbit types, commercial versus government use, or other business-driven rules. This flexibility allows operators to precisely control where automatic beam switching is enabled or disabled.

What sets D-ABS apart is the external control it provides for inter-domain switching while preserving the highly scalable and resilient autonomous beam switching control within each domain. Operators can implement their own network rules and policies, ensuring greater control over how their networks function. Its deterministic approach to switching means operators can confidently manage transitions, whether directing a single terminal or a selected group of devices, resulting in greater efficiency and reliability.

By offering this level of adaptability and control, D-ABS lays the foundation for smarter, more dynamic satellite networks that can meet evolving demands.

IDIRECT'S DOMAIN BASED AUTOMATIC BEAM SWITCHING



COMMON COMPETITOR BEAM SWITCHING

TRENDS: ADVANCED MOBILITY FOR THE SATELLITE NETWORK REQUIREMENTS OF THE NEAR FUTURE

ST Engineering iDirect is the ground segment leader in advanced mobility with best-in-class technologies that are proven and ready to support satellite network operators facing these challenging scenarios:

Multi-Orbit Networks: Global and regional satellite operators are increasingly integrating hybrid capacity to better differentiate their services.

Legacy and Next-Gen Satellites: With varying satellite capabilities—such as bent-pipe and software-defined systems—operators must seamlessly switch between these assets.

Migration Support: During Intuition deployment, leverage D-ABS technology to transition efficiently between current and new networks.

National and Regional Domains: Create satellite network domains tailored to country, regional, or global scopes.

Commercial and Government Compliance: Configure and manage domains to ensure adherence to regulatory policies without impacting commercial traffic.

Consolidation Readiness: Operators undergoing consolidation can enable smooth transitions between distinct and disparate networks.

OpenAMIP Standard

OpenAMIP (Open Antenna Modem Interface Protocol) is a standardized protocol – originally designed by ST Engineering iDirect – to facilitate communication between satellite antennas and modems. It enables seamless integration and interoperability between different manufacturers' equipment by providing a common language for exchanging information.

Spread Spectrum and VL-SNR

Spread spectrum technology enhances communication reliability and security. By reducing the spectral density of transmissions, it minimizes the risk of interfering with adjacent satellites, ensuring cleaner and more efficient use of the spectrum. Spread spectrum can mask carriers by embedding them under background noise, making traffic activity virtually undetectable during stealth operations. This provides a vital layer of security for sensitive communications, reinforcing its value in both commercial and defense applications, especially for communications-on-the-move.

Very Low Signal-to-Noise (VL-SNR) technology lends an additional level of efficiency compared to legacy spread spectrum implementation.

Acquisition Signaling Carrier

Terminals need specific information to connect to a satellite network. This information may change daily or several times a day as satellite operators adjust capacity to meet shifting demand. The Acquisition Signaling Carrier plays a crucial role by broadcasting key details—such as beam footprints, frequency parameters, and polarization—so terminals within the network can seamlessly adapt to these changes.

INTUITION

EXPERIENCE A FUNDAMENTAL CHANGE IN SATELLITE NETWORK DEPLOYMENT

Intuition is an ***advanced satellite networking ground system*** that combines major breakthroughs with ST Engineering iDirect's industry-best technologies. Intuition is built on five core capabilities:

Virtualized, Cloud-Based Infrastructure: Scale services quickly and cost-effectively for the fastest time-to-market.

Intelligent Multi-Orbit Support: Deliver services for every application on every orbit.

Standards-Based Network Convergence: Integrate satellite networks seamlessly into the global communications domain.

End-to-End Orchestration: Dynamically adjust resource and service allocation to meet evolving demand across a network of networks.

Flexible Go-to-Market Strategies: Reach more customers with the widest range of business models.

Global Bandwidth Management

Satellite capacity is a valuable, limited resource, and managing it is both challenging and costly. Optimizing network performance and bandwidth is essential for delivering high-quality service while controlling costs. Global Bandwidth Management (GBWM) empowers satellite operators with these benefits:

Universal Configuration of Bandwidth

GBWM simplifies satellite network management by treating the entire fleet as a single bandwidth pool, enabling scalable and seamless service configuration across global, regional, and non-contiguous networks. This far outperforms traditional QoS, which relies on repetitive manual setups for adding capacity or users.

Global Congestion Management

GBWM eliminates inefficiencies of beam-based QoS silos by enabling real-time network-wide allocation and load-balancing, enhancing SLA fulfillment without wasting valuable bandwidth through over-allocation.

Flexible Service Area Shaping and Enforcement

GBWM optimizes resource utilization – and maximizes revenue – by designing tailored service footprints for specific needs such as regulatory requirements, national borders, or offshore coverage. These unique functions include:

GBWM AT-A-GLANCE

- ***Universal configuration*** of bandwidth
- Real-time, ***network-wide bandwidth allocation of dynamic,*** multi-orbit capacity
- ***Global congestion management***
- Continuous ***optimization and load balancing*** for mobility
- Worry-free SLAs with ***precise service areas and enforcement***
- Freedom to engage in ***numerous paths to market***

Geoscope defines where service commitments are valid based on service areas that can be independent of beam footprints. Different rules can be applied within the Geoscope.

Service scheduling can modify service based on typical or planned periods of high or low usage. Parameters set for automatic or scheduled changes can be configured to certain time zones or geographic regions.

Allocation fairness specifies how to handle equally prioritized subscribers when there is contention for bandwidth.

Load balancing moves eligible terminals to less congested beams to meet service level agreements despite congestion, even increasing IP throughput during expected or unplanned congestion.

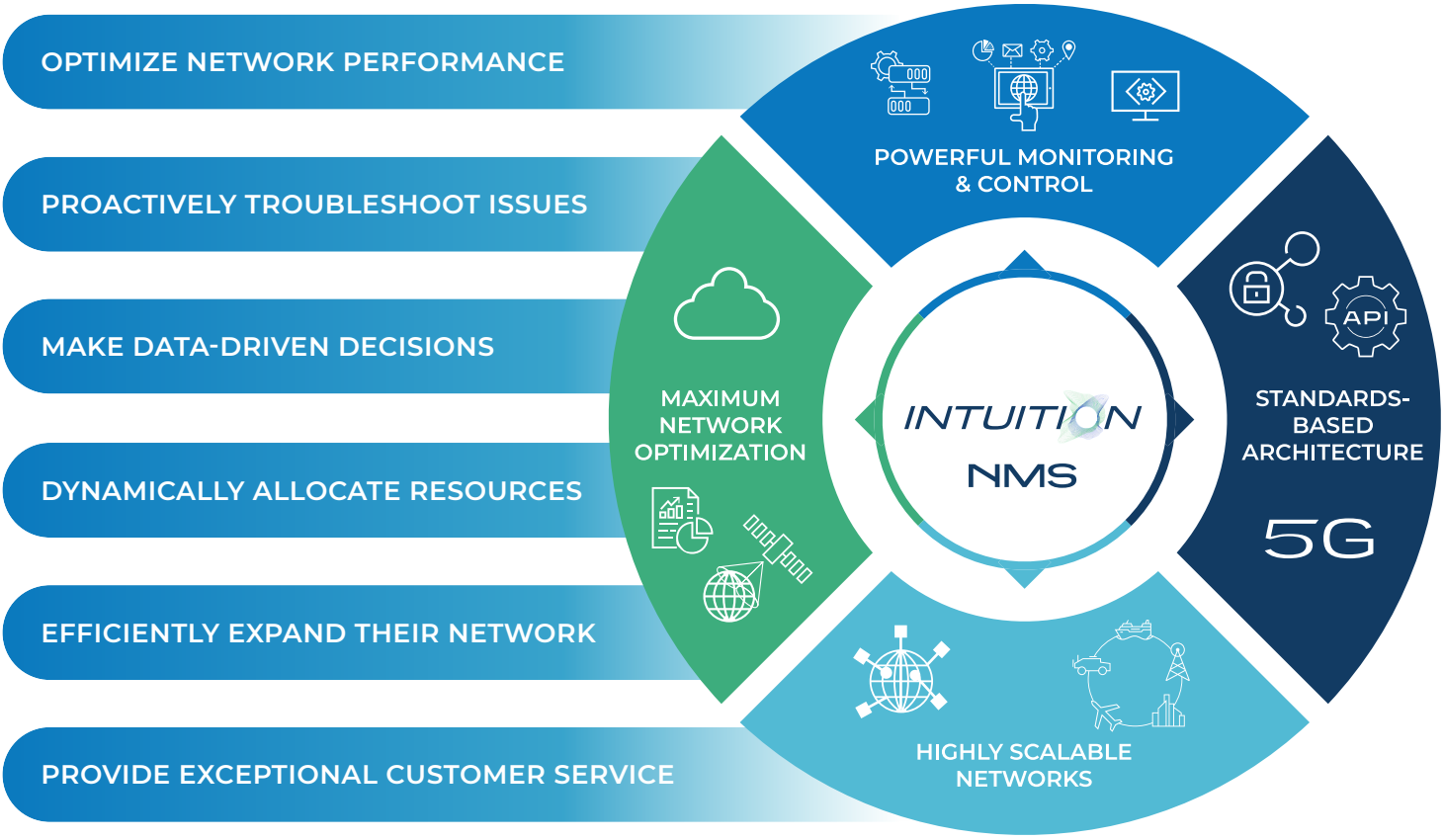
Service modes allow for the bandwidth pool to be optimized and allocated based on the type of service, such as direct-to-the-end-user or VNO modes.

Enable Numerous Go-to-Market Models

GBWM supports satellite operators to generate more revenue through diverse go-to-market configurations. With GBWM, satellite operators and service providers can configure services for multiple customer types from a single bandwidth pool.

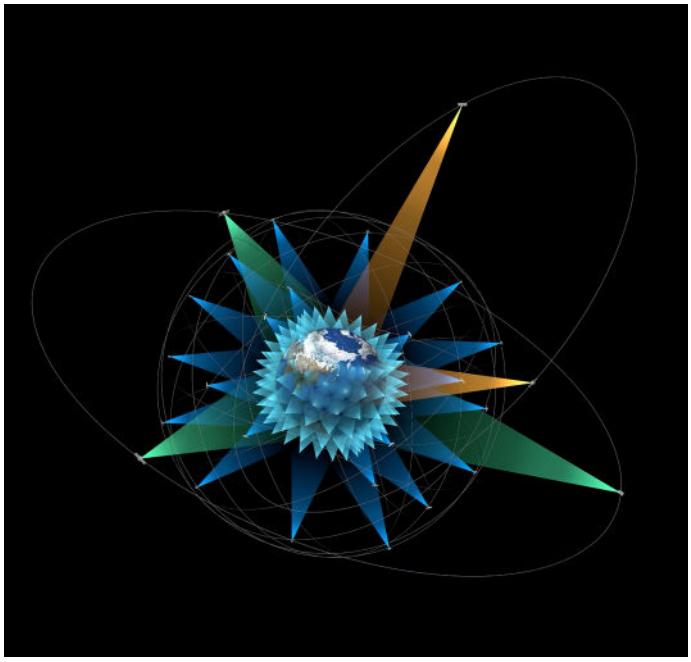
Intuition NMS

Intuition NMS offers comprehensive tools from monitoring network health and elements to optimizing the allocation of resources and seamlessly provisioning services. Its cloud-based, microservices architecture allows for continuous performance improvements and dynamic operations. The system leverages standards-based APIs for integration with OSS/BSS systems and ensures high security with NIST and OWASP standards. Flexible cloud deployment options enable cost-effective scaling and adaptation to market needs. With Intuition NMS, satellite operators have support for these:



ADVANCED MOBILITY MEETS MULTI-ORBIT: FROM BEAM SWITCHING TO SATELLITE SWITCHING

iDirect's advanced mobility features are shaping the future of multi-orbit satellite networks by delivering the seamless transitions that modern mobility environments demand. With a legacy of cutting-edge innovation, iDirect is now expanding its capabilities to bridge networks across different orbits, ensuring uninterrupted connectivity and performance.



NGSO Terminal Acquisition Algorithm

Our new single tracking solution is a breakthrough in enabling seamless operations within multi-orbit satellite environments. Designed to support transitions between various orbit types—including GEO, HEO, GIO, MEO, and LEO constellations—this solution enables uninterrupted connectivity and simplifies network deployment.

At the core of this innovation is a unique algorithm that delivers precise frequency and timing compensation, accelerates network convergence for quicker transitions, and synchronizes dynamic satellite beam footprints through advanced beam maps. These features work together to provide fast system acquisition and highly reliable beam switching, even in complex environments.

By eliminating timing variations caused by changes in orbital paths, the new algorithm significantly improves tracking of satellite maneuvers and enhances switching performance across diverse orbits. This ensures a smoother user experience, simplifies operations, and enables highly scalable multi-orbit networks for modern connectivity demands.

Industry-First Case Study: GEO – NGSO Satellite Switching

Our NGSO Terminal Acquisition Algorithm is already in a customer's on-orbit testing to extend their GEO-based network with NGSO satellites. This represents a key milestone and industry-first breakthrough in achieving a multi-orbit capability which will supply continuous satellite coverage for uninterrupted service in a region previously difficult to reach.

The algorithm facilitates smooth satellite and orbit switchovers—either automatically or through an external management system—depending on operational requirements. This process ensures that each terminal consistently accesses the best possible service based on its position and network conditions.

By combining the complementary attributes of satellites in two orbits, this innovation enables operators to provide continuous, high-quality service in one of the most underserved regions of the world while maintaining optimal performance through efficient beam switching and algorithm-driven coordination.

UNLOCK REVENUE POTENTIAL IN MOBILITY MARKETS

The satellite industry is transforming with the rise of multi-orbit constellations and the integration of satellite technologies into telecommunications. To stay competitive, satellite companies need to adapt quickly, navigating modern network complexities while meeting growing market demands.

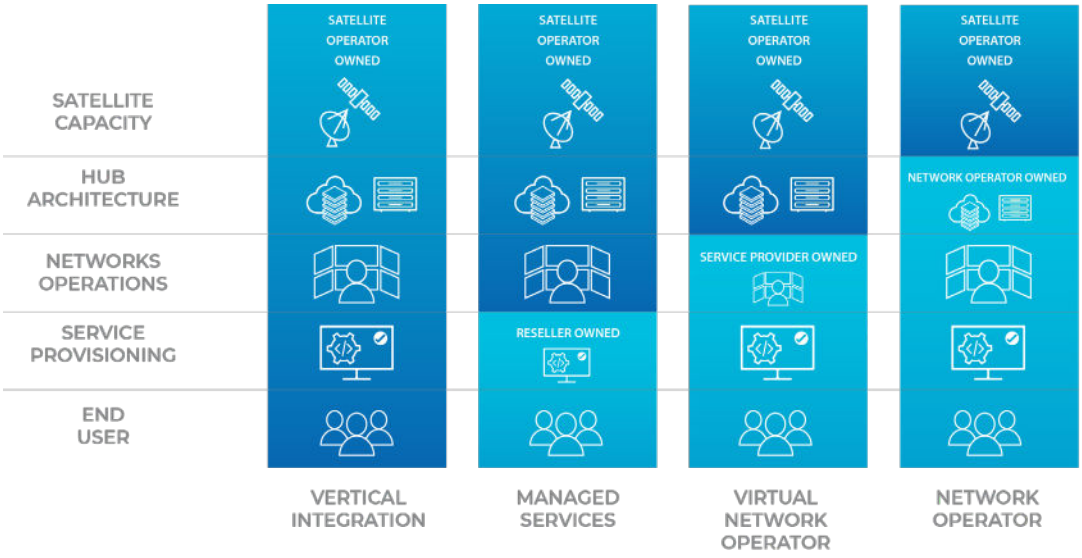
This shift brings significant growth opportunities, allowing businesses to tap into new markets and expand their reach. The Intuition advanced satellite networking ground system is designed to help organizations thrive in the dynamic mobility sector. Intuition enables scalable revenue growth with these **key revenue-enhancing advantages of the Intuition ground system:**

Unified Platform with Versatile Capabilities

A single, dynamic system to streamline operations using multi-access waveforms and diverse modem options to address a variety of business needs, ensuring adaptability to changing market demands.

Optimized Revenue Models

Intuition's Global Bandwidth Management (GBWM) enables precise bandwidth allocation and flexible service modes. It supports virtual network operators (VNOs) and service providers with customizable resource management, fostering diverse revenue streams.



Beyond Tradition Quality of Service

GBWM eliminates beam-based silos common in traditional Quality of Service (QoS). GBWM ensures consistent, congestion-free operations that meet Service Level Agreement (SLA) standards while maximizing efficiency.

Expert Technical Support with TechOps

iDirect reduces the burden of satellite network management. Organizations can rely on our platform specialists for comprehensive support, enabling your internal teams to focus on scaling core business.

INTUITION

START YOUR
JOURNEY TOWARD
ADVANCED MOBILITY

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