KEYSIGHT

Seamless Connectivity Everywhere: NTNs in the 6G Era

Designing smarter, safer, and more inclusive networks

From a Single Satellite to Thousands in Orbit

In the 1950s, a single satellite marked the beginning of the space age.

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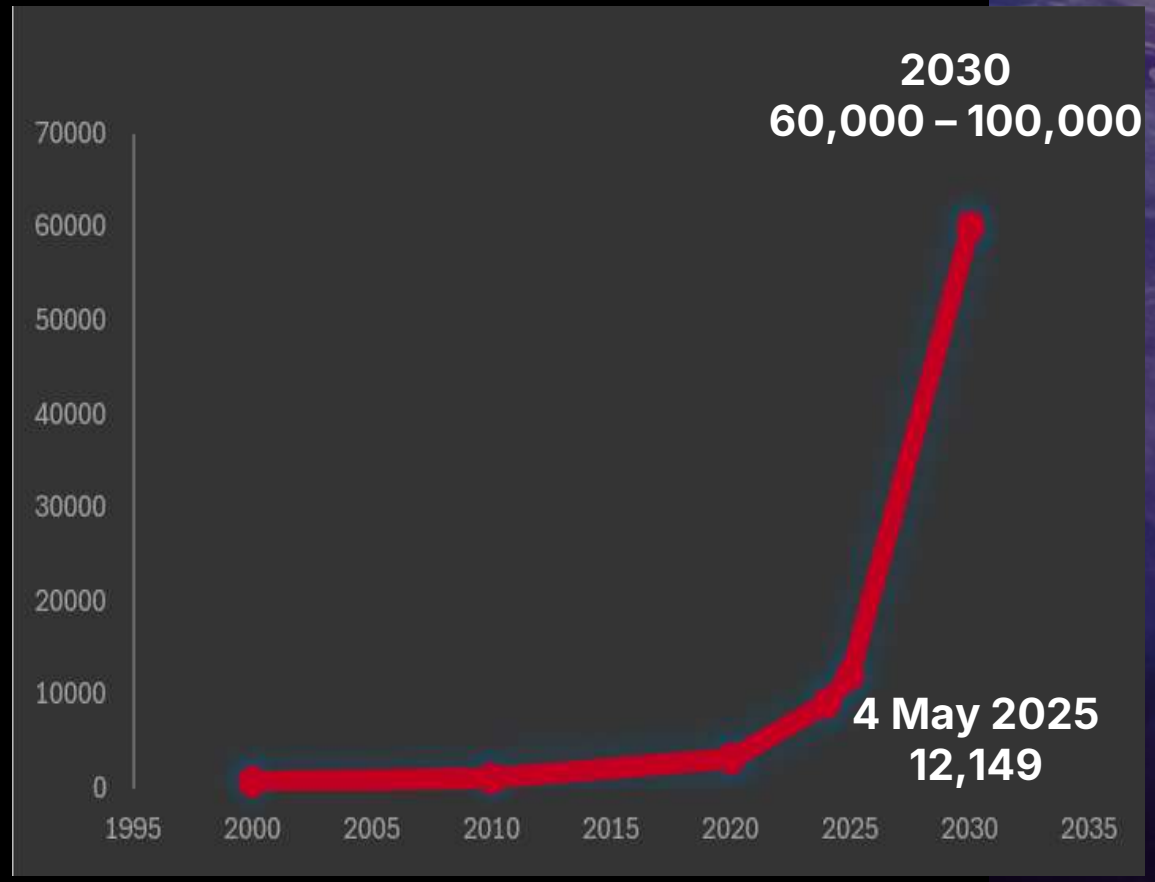
From a Single Satellite to Thousands in Orbit

Active satellites in orbit



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The Connectivity Gap Challenge

Rural Communities

Millions lack reliable high-speed internet access

Disaster-Stricken Regions

Critical communications severed when infrastructure fails

Remote Industries

Mining, maritime, and energy sectors operate in connectivity dead zones

Non-Terrestrial Networks promise to fill coverage gaps, creating unprecedented opportunities for progress.

Agenda

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NTN Applications

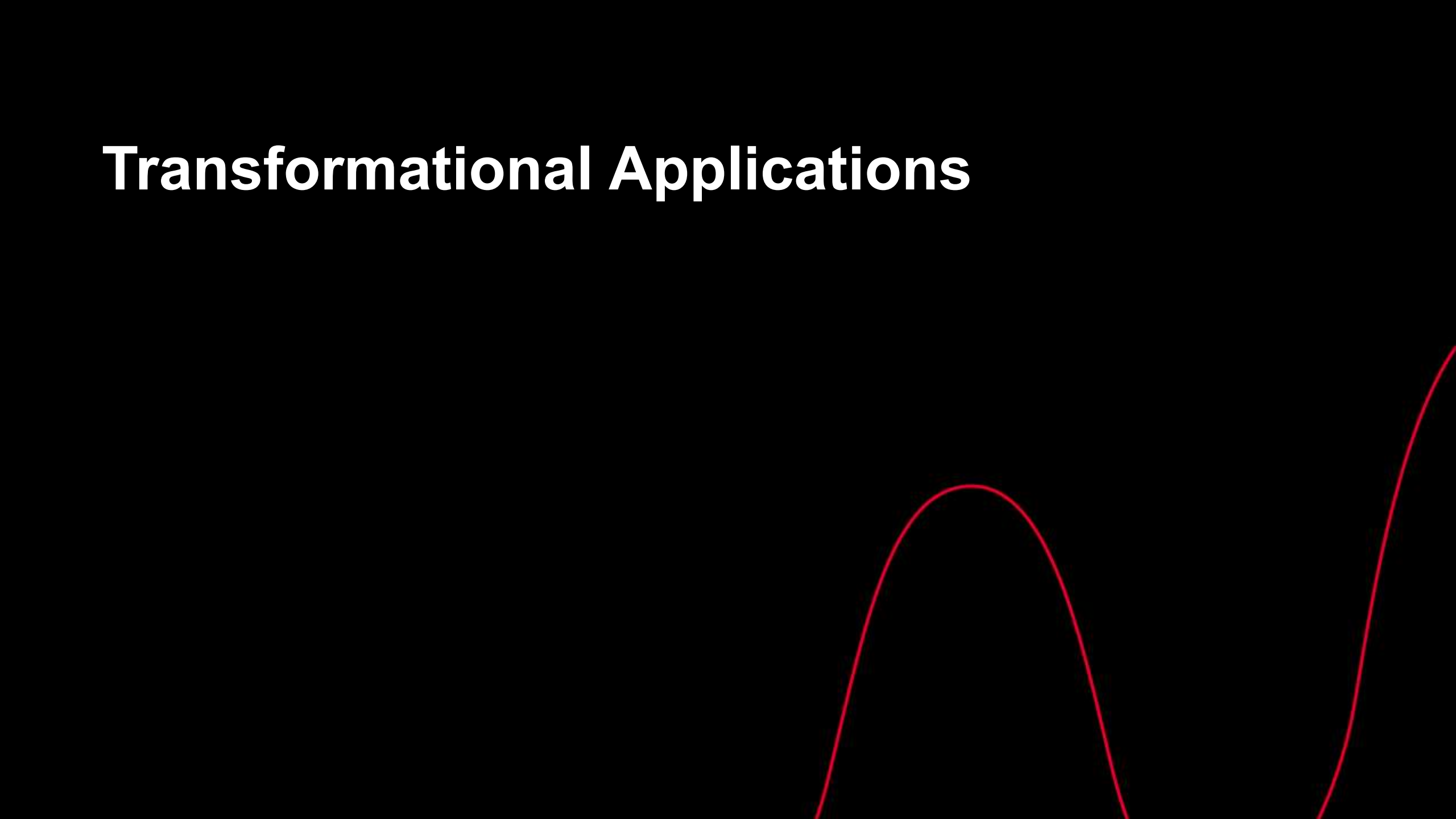
02
Key Technologies

03
Challenges Ahead

04
Design & Modeling Considerations

05
NTN Opportunities

Transformational Applications



Direct-to-Device

- Phone coverage in deserts, forests, mountains—no extra hardware needed
- Better access to education, telemedicine, emergency services

Autonomous Mobility

- Drones inspecting remote pipelines, vehicles navigating safely
- Urban air mobility collision prevention, precision agriculture

Disaster Relief

- Instant activation when terrestrial networks fail
- Life-saving communications for first responders

Not just more coverage—smarter, safer, more inclusive connectivity.

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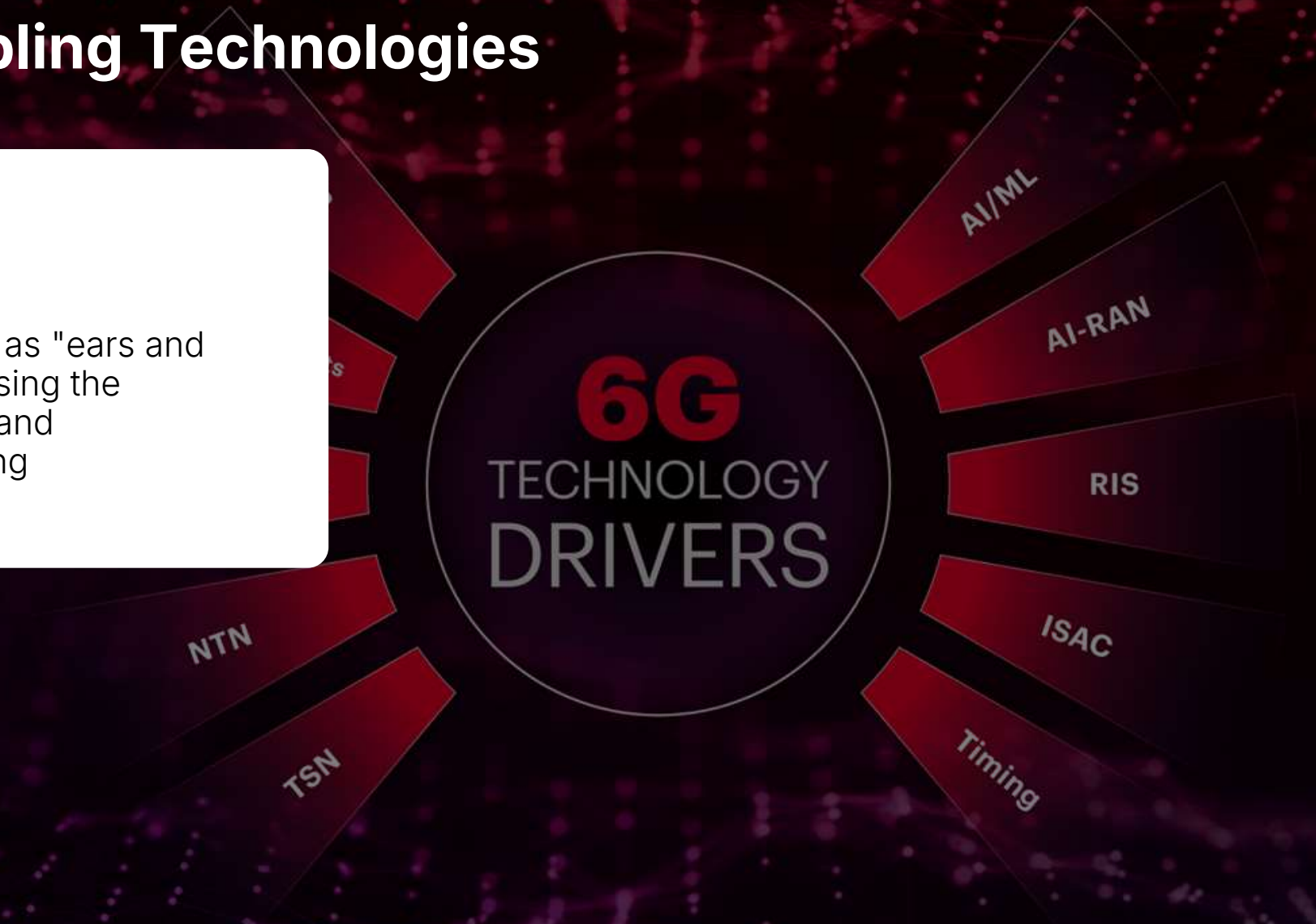
Key Enabling Technologies

ISAC

Networks act as "ears and mouths“, sensing the environment and communicating



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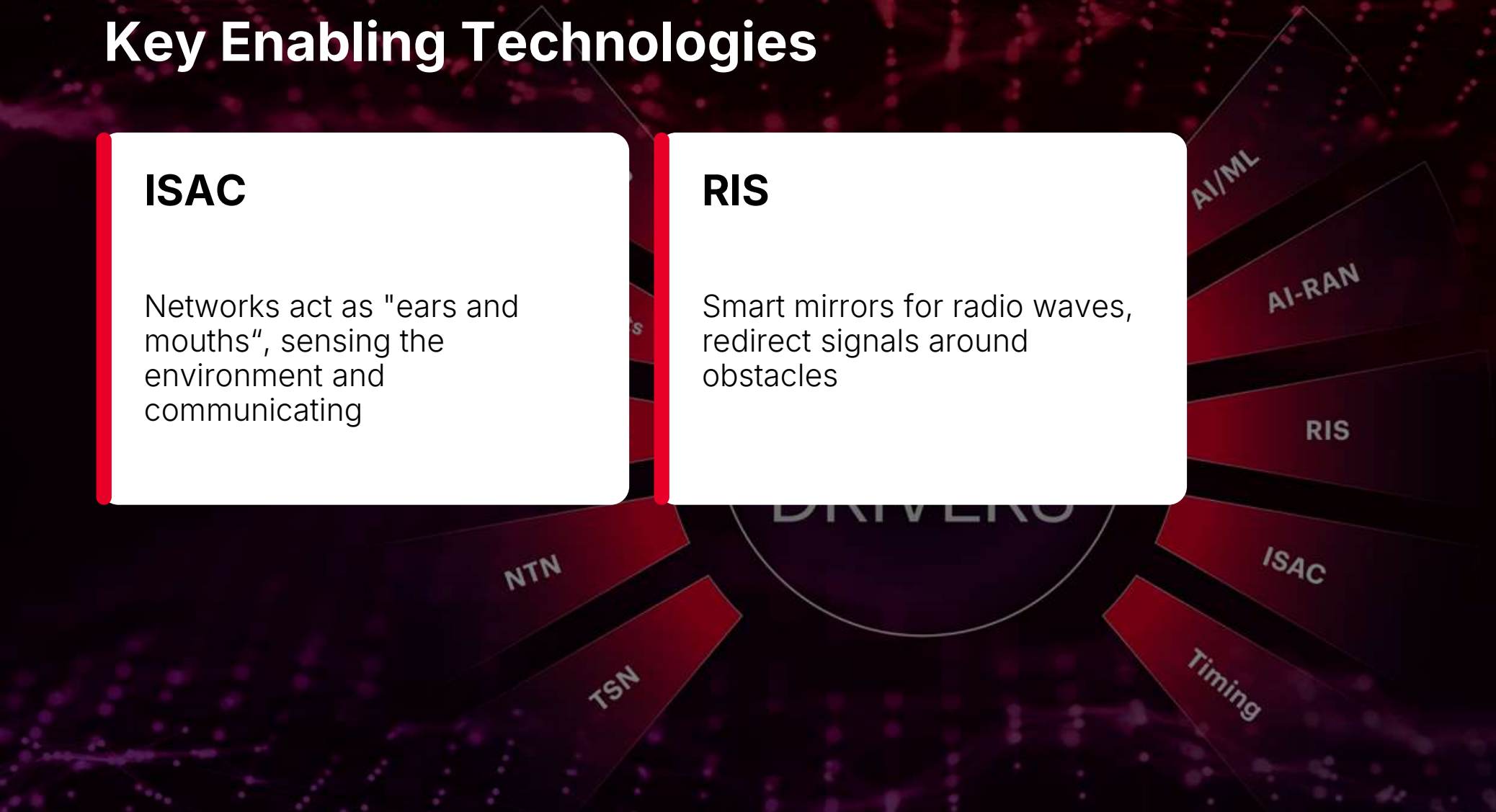
Smart mirrors for radio waves, redirect signals around obstacles



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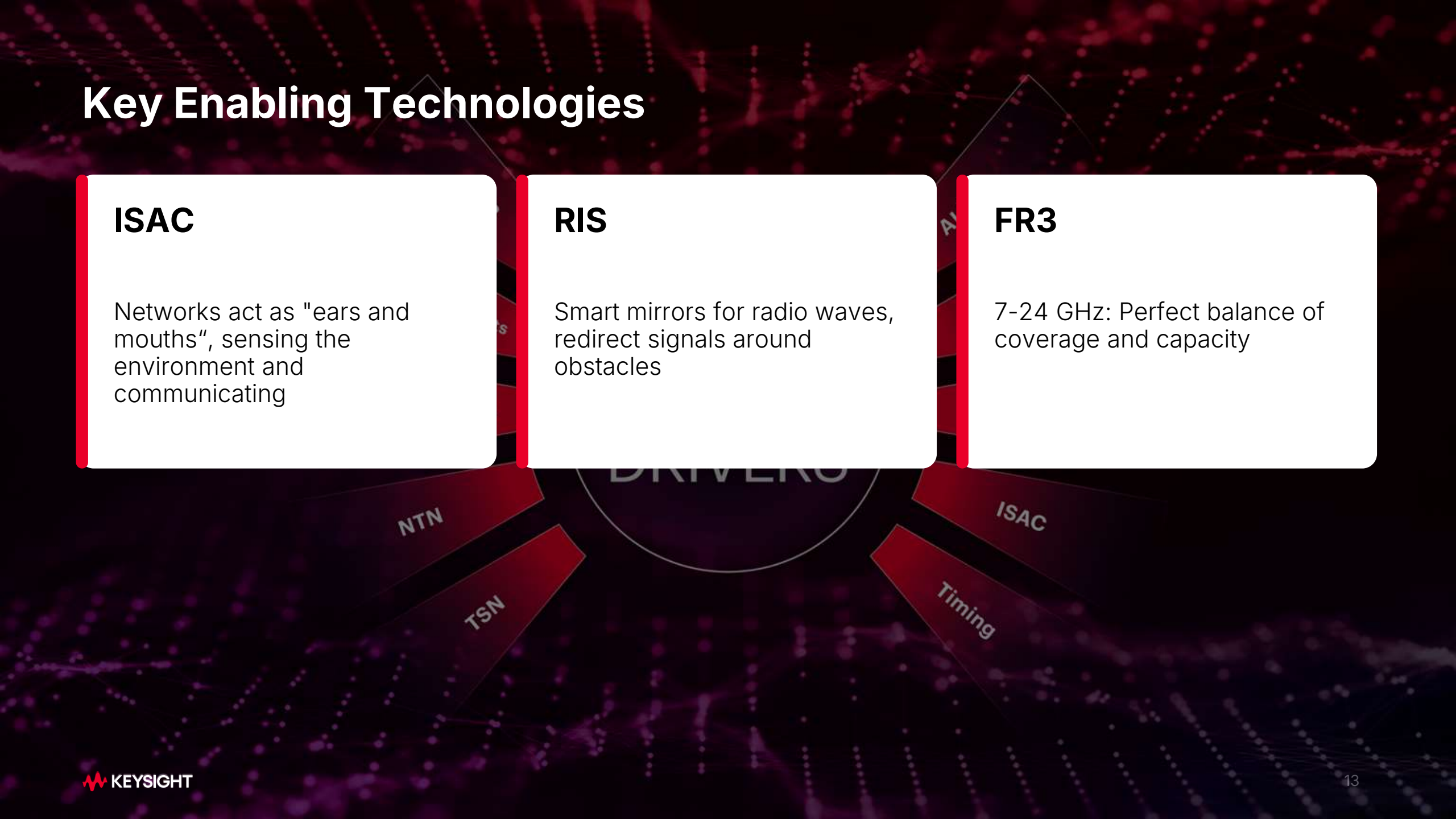
7-24 GHz: Perfect balance of coverage and capacity



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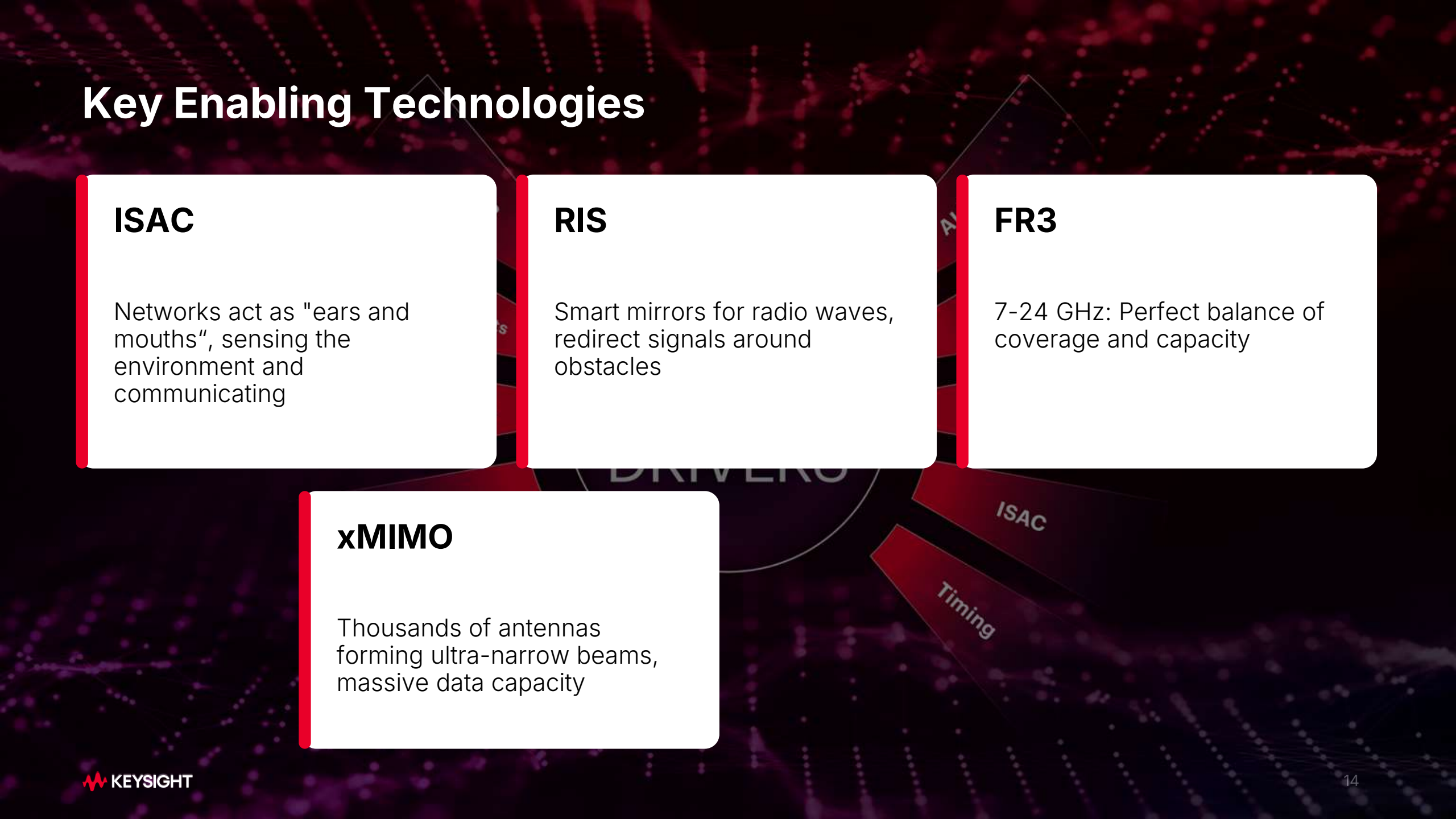

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AI-RAN

Networks learn and adapt, optimizing spectrum, predicting handovers

Intelligent, adaptive, and resilient NTN-enabled 6G ecosystem.

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Technical & Economic Challenges

Spectrum Harmonization

Satellite and terrestrial operators compete for same airwaves

Like coordinating air traffic across dozens of airports

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Satellites lack power and cooling systems

Balancing performance with power and heat management essential

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Business Models

Constellations cost billions to launch and maintain

Must prove value across multiple markets

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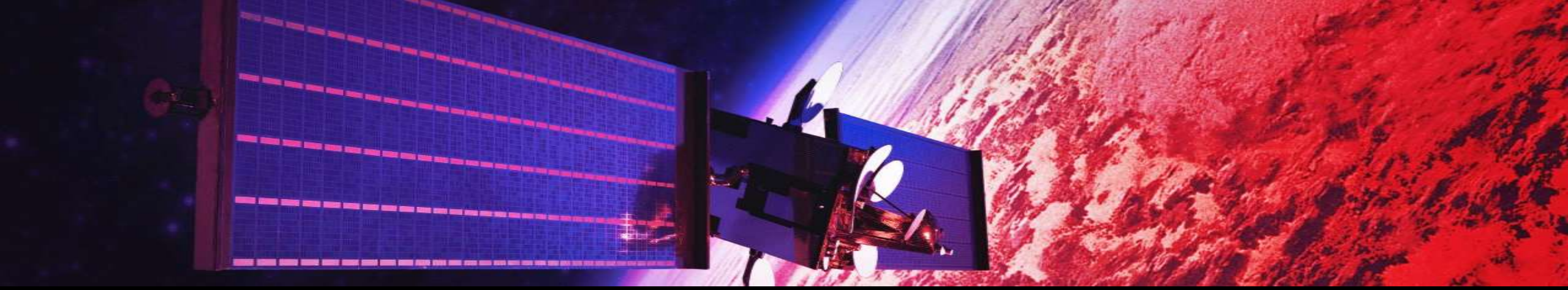
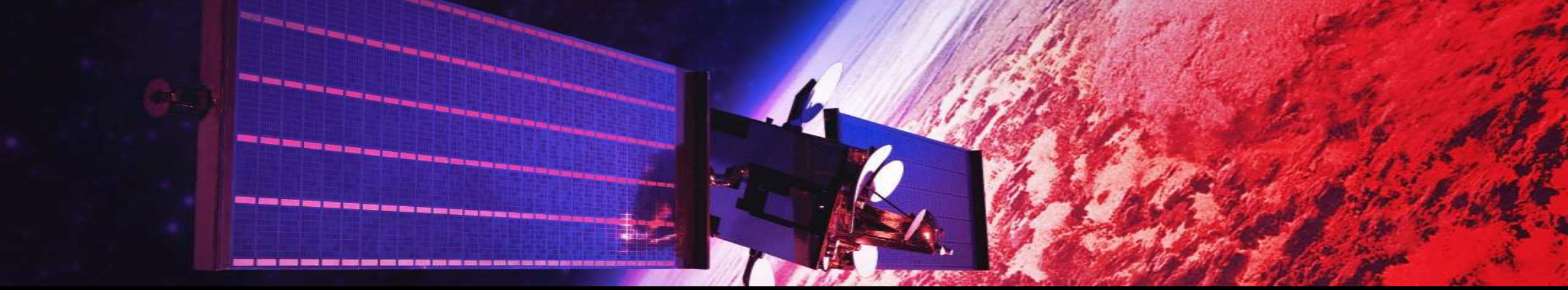


Realistic System Design & Modeling

Lesson from 5G: practicality critical to success



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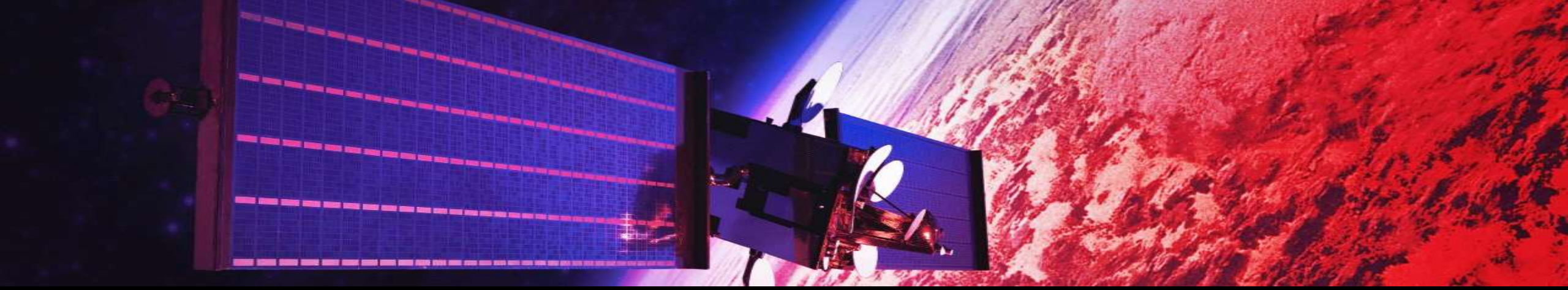
Energy Efficiency

Networks "sleep" during low traffic

Satellites adjust beams dynamically



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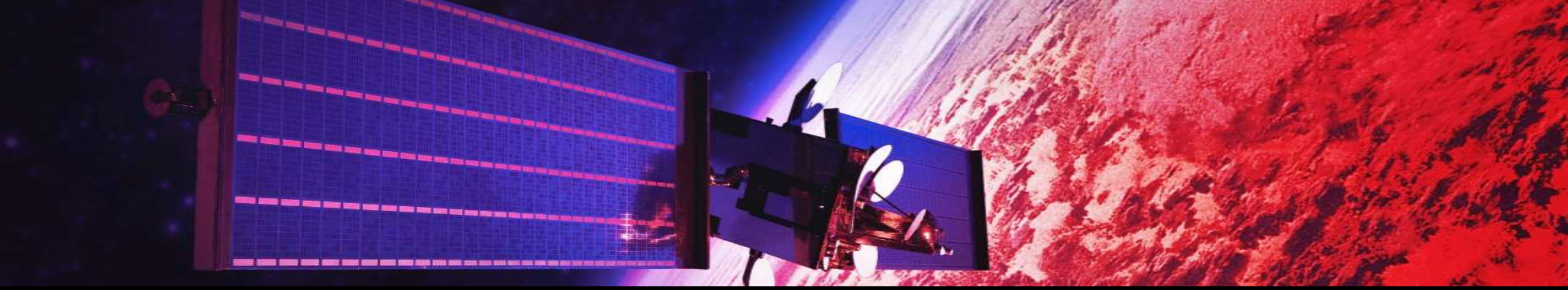
Continuous authentication across borders and industries



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Digital Twins
High-fidelity virtual models test real-world conditions
Before expensive satellite launches or intensive constellation deployments

NTNs: From Orbit to Opportunity

Taking what begins in space and turning it into real-world impact on Earth.

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Resilience

Reliable communication for disaster response.

Key Takeaways

Global Connectivity
Remote communities to autonomous vehicles and disaster zones

Enabling Technologies
ISAC, RIS, FR3, xMIMO and AI-RAN making vision possible

Collaboration Required
Spectrum, standards, hardware, and business model challenges need teamwork

Realistic Design
Simulation, sustainability, and security essential for success

Orbit to Opportunity
Turning satellites into Earth-based opportunities

The Future of NTNs in 6G

> “Innovation in NTNs must be bold—but grounded. Only realistic, efficient, and secure designs will scale across Earth and space.”

Join us this week for a deeper dive into NTNs in the 6G era with various Keysight experts.