

# The Practice of bridging Mobile and Satellite

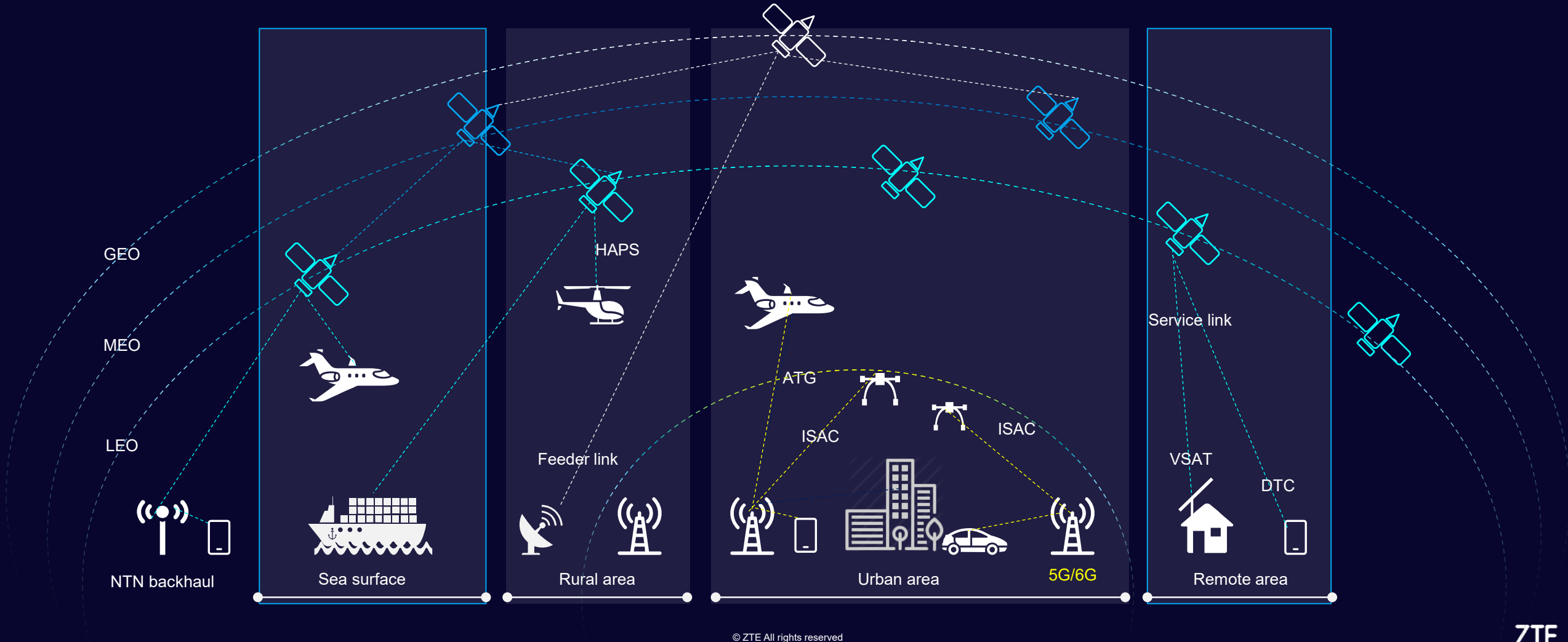
A detailed illustration of a satellite in orbit above the Earth. The satellite has a central body with various instruments and two large, rectangular solar panel arrays extending outwards. The Earth's surface is visible below, showing a mix of land and ocean with swirling cloud patterns. The background is a deep blue space filled with small, distant stars.

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# Satellites Serve as Complementary Coverage Extension to Existing TN

- **As a supplement to TN:** satellites prioritize functional connectivity over extremely high-throughput data rates.
- **Focus on ubiquitous connectivity:** remote areas, sea surfaces and other regions beyond TN coverage



# LEO Satellite Communications: Commercial Value in Key Scenarios



Satellite communications find broad applications across diverse sectors. The four primary sectors are consumer electronics, commercial transportation, enterprise and government.



## Fixed Broadband

- Delivers high-speed internet to homes and enterprises
- Application Scenarios: Internet for remote areas, enterprise private networks, and sites backhaul.



## Roam Broadband

- Provides connectivity for aviation, maritime, land mobility.
- Application Scenarios: In-flight/in-maritime internet and land transportation.



## Worldwide IoT

- Enables connectivity for massive low-power devices globally.
- Application Scenarios: Energy/environmental monitoring, logistics tracking, emergency rescue



## Direct-to-device (D2D)

- Allows smartphones to connect directly to satellites.
- Application Scenarios: Outdoor emergency calls, TN supplementation, and global roaming.

# Standard and Regulation Progress in ITU-R & Regional Groups



WP5D



- Candidate frequency bands
- Regulation conditions for protection of terrestrial IMT, 5 options for consideration

PFD per beam

Aggregate  
PFD per  
system

EPFD per  
system

Aggregate PFD mask for  
Multi-systems

Aggregate PFD/EPFD  
from Multi-systems



WRC-27 agenda item 1.13

- **DC-MSS-IMT**
- IMT bands below 2.7GHz
  - ✓ Possible New allocation to mobile-satellite service
  - ✓ Complement terrestrial IMT network coverage



WP4C



- Sharing and compatibility studies with incumbent services
- Develop regulatory conditions
- Draft CPM report



D2D connectivity is gaining strong momentum across the Asia-Pacific, with regional research engagement intensifying.

- APG27-3 updated the APT Preliminary Views on Agenda Item 1.13 based on input contributions from 18 APT Member administrations
- AWG is developing reports on Emerging Satellite Technologies and LEO Systems and on Applications and Technologies for NTN and TN Multi Operators.



Study on the feasibility and coexistence conditions of D2D-IMT in EU-harmonized terrestrial mobile bands pursuant to an EC mandate.

- Candidate bands discussion in FM44, with 2.6 GHz TDD, 26 GHz, and 42 GHz bands excluded for D2D-IMT due to technical constraints and lack of interest.
- Agreed metrics for protection of IMT (aggregate PFD for protection of UE and EPFD for protection of BS) liaised from SE40 to PT1

# Pioneering NTN Journey: Milestones toward Space-Terrestrial Integrated 5G/6G

Y2026

The world's first OBP-based (regenerative mode) NR-NTN satellite for both D2D and broadband is targeted for launch.

Y2025

Real-time voice lab validation over LEO NR-NTN was achieved, with reliability verification finished for key NTN core components.

Y2024

The world's first in-orbit trial for LEO NR-NTN and operator-grade IoT-NTN were accomplished, moving toward pre-commercial networks.

Y2023

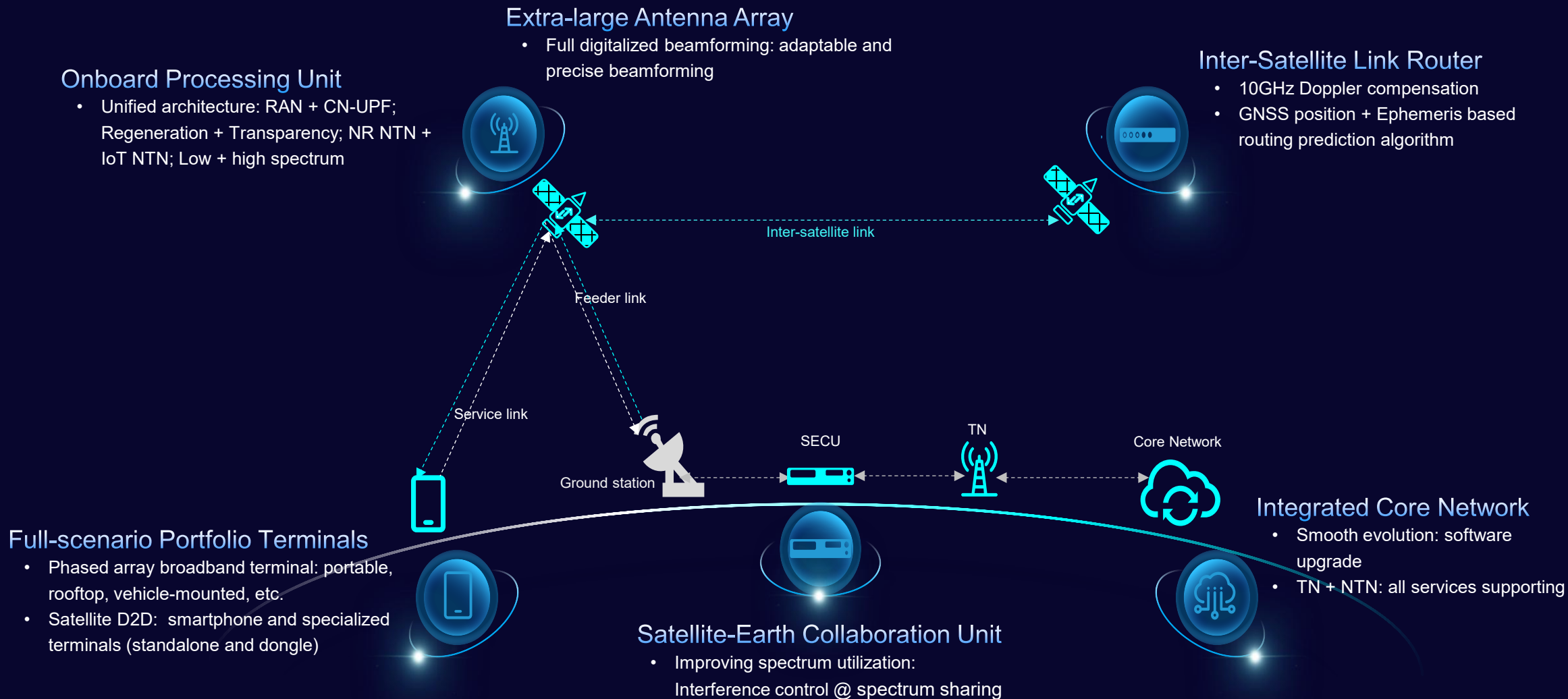
Multiple landmark field and lab tests were completed, covering S-band IoT-NTN, D2D services, LEO-satellite-based NR-NTN lab verification.

Y2022

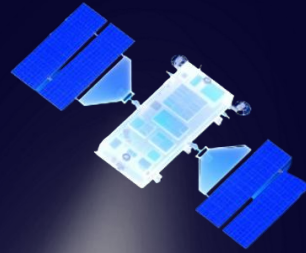
The world's first operator-led 5G NTN field trial verification was released, kicking off practical validation of 5G non-terrestrial network technologies.



# ZTE's NTN: Expanding Cellular Network into Space



# On-Satellite Base Station with Extra-large Antenna Array



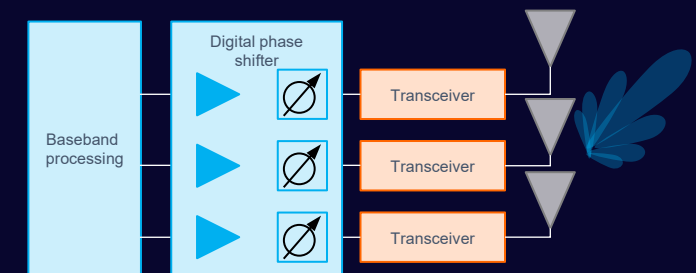
## On-satellite Processing Unit: multiple applications with one satellite

Part or all of 5G base-station functions are deployed on satellites, forming a "5G base-station flying in space".

- Compliance with 3GPP NR-NTN and IoT-NTN
- Compliance with R17/R18/R19 protocol evolution
- Automatic mode switching between transparent and regenerative
- Co-deployment with core network (UPF)
- Beam forming modes: scanning, staring and hopping

## Extra-large Antenna Array: full digitalized beamforming

- Fully-digital beamforming
- In-house DPD technology
- Support for S-band and Ka-band
- Co-design of Ka IF and antenna
- 100MHz clock input and real-time calibration
- EVM: < 10%



# Satellite Laser Communication: New Bond in Space

## Ultra-long-haul Transmission

- Er/Yb: dual cladding OA for high gain
- 5 Watt @ stable high power

**5000+ km**

Max link distance | 66% improvement of industry coverage

## Ultra-low BER Connection

- 4th-power compensation algorithm
- $\pm 10\text{GHz}$  doppler frequency shift

**$10^{-15}$  BER**

2 orders of magnitude improvement to industry ( $10^{-13}$  BER)

## Ultra-high Reliability

- Multi-layer redundancy architecture
- AI-driven autonomous fault recovery

**0.96 Availability**

23% higher than ordinary systems (0.78), mission-critical stability



# Diversified NTN Terminals, Connecting Everywhere from Space



Phased array  
broadband terminal

- High-speed dual-band Wi-Fi
- Wide satellite field of view
- Ultra-strong outdoor weather resistance



Smartphone

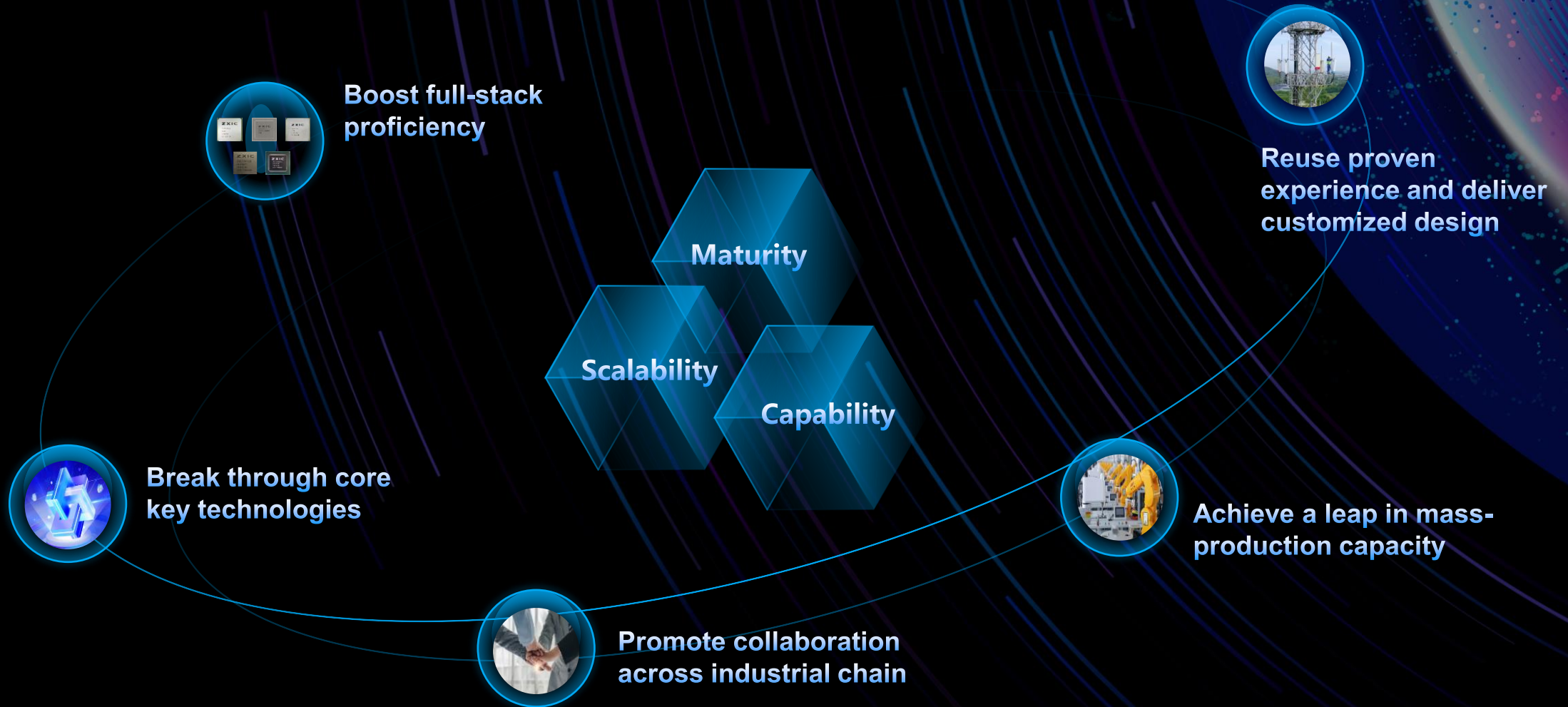
- Snapdragon 8 Elite flagship
- Bidirectional NTN satellite communication
- 6150mAh silicon-carbon battery



Dongle

- Satellite messaging for all smartphones
- Plug-and-play
- Bluetooth and USB connections

# Powering a Shared Space-Connectivity Future



ZTE



**THANKS**