



Integrated Sensing and Communication (ISAC) in 6G

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Next-gen network for a rapidly evolving world

Cellular



EVOLVING

Applications

User behavior

Traffic patterns

Device types

Network architecture



GEN
AI



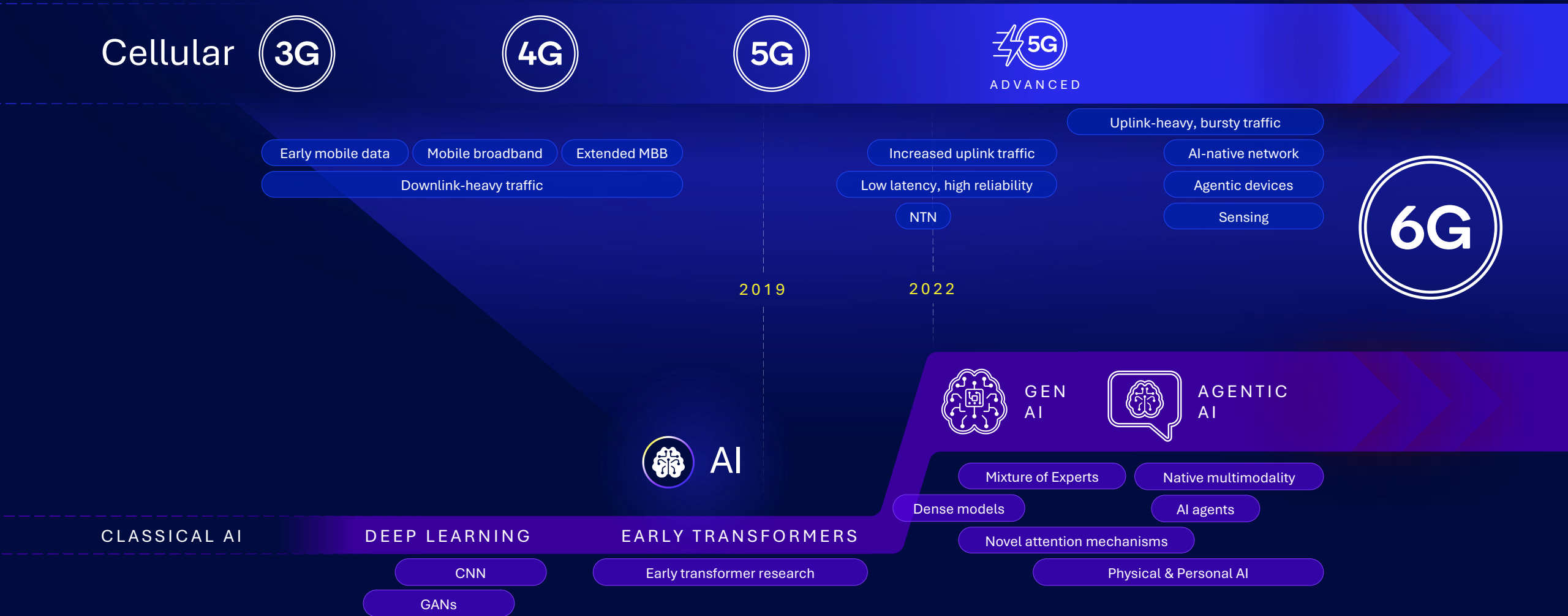
AGENTIC
AI

CLASSICAL AI

DEEP LEARNING

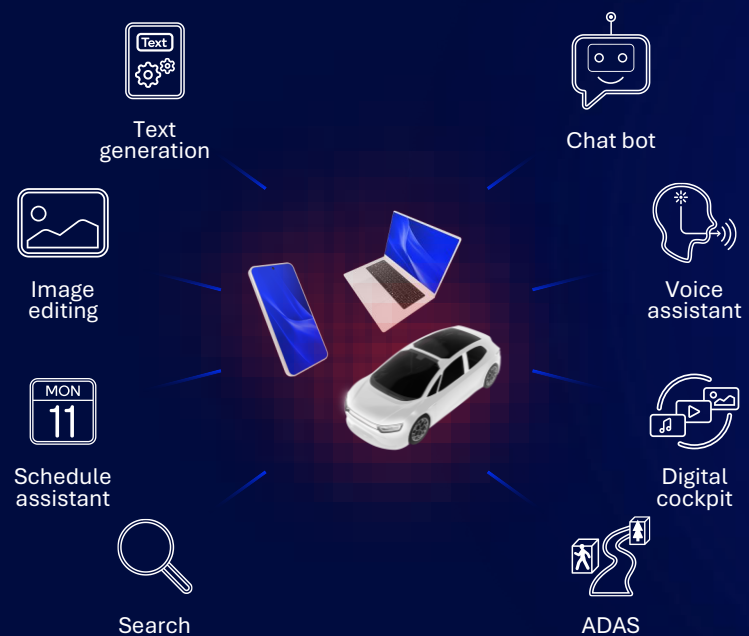
EARLY TRANSFORMERS

Next-gen network for a rapidly evolving world

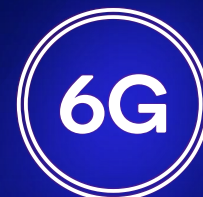




Device-centric apps

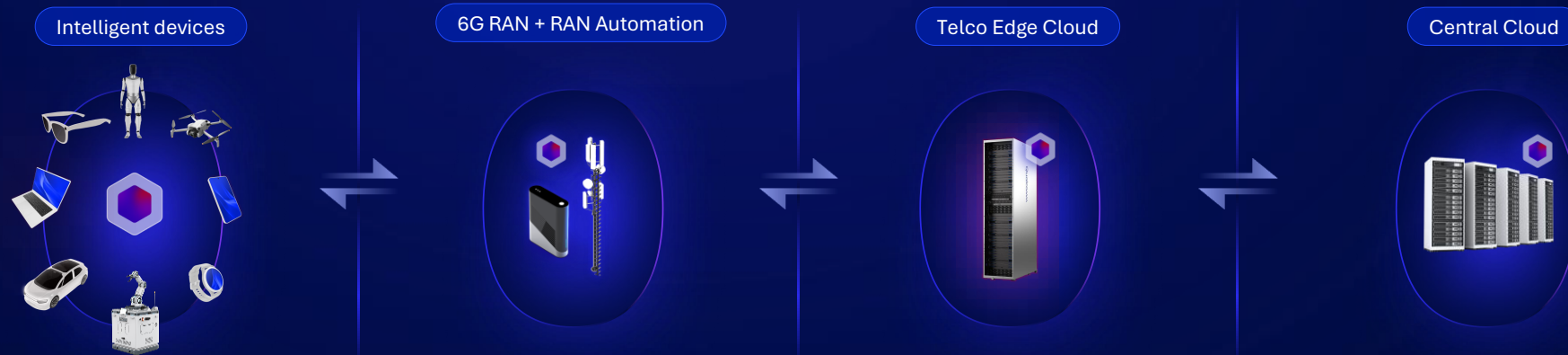


New age of AI



Agent-centric multi-device experiences

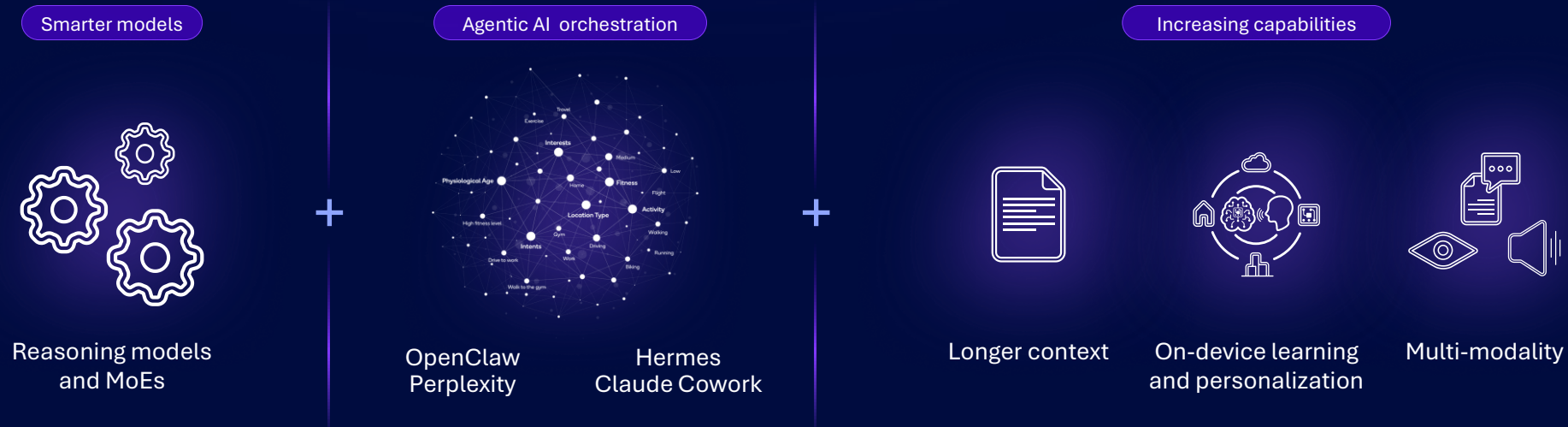
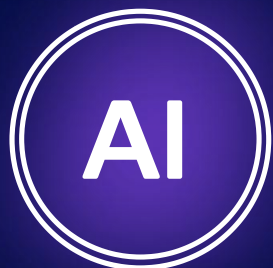




CONNECTIVITY

WIDE-AREA SENSING

HIGH-PERFORMANCE COMPUTE





Connectivity

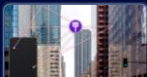
For an AI-ready network



AI agentic modems
New AI-native devices
Giga-MIMO radios

AI-powered devices today



	5G-WiFi handoffs		5G mobile gaming
	Social Media		AI traffic
	Multi-antenna Management		OTT voice and video
	Network-condition adaptation		Beam management, Range extension

Agents
On-device inference
AI-powered radios, modems

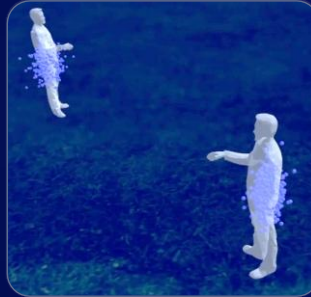
6G

Wide-area sensing

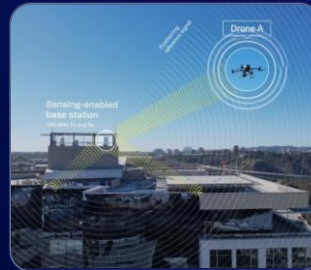
Autonomous robot
location / speed detection



Presence detection



Aerial drone tracking



MULTI-MODAL AI WITH 6G RF MODALITY



RF
measurements



Map



Radar



Camera



Performance
metrics

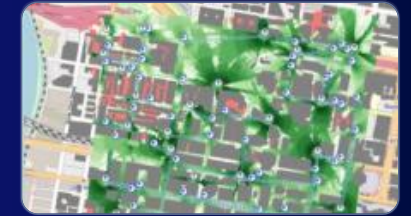


CAD
drawing



Sensors

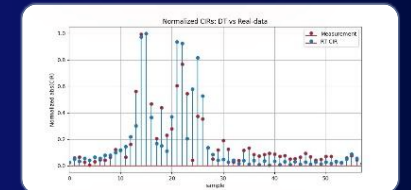
Network dimensioning



Perception-aided
beam management



Channel generation
for ML model tuning



Joint communication
and sensing for cars

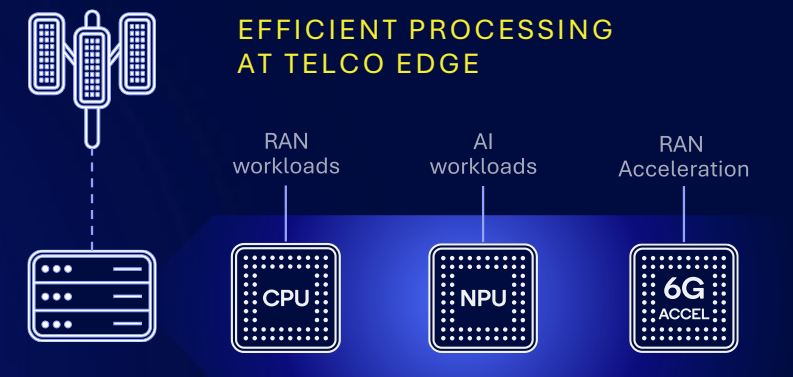




Compute

Energy-efficient,
High-performance

Future of RAN compute



AUTONOMOUS NETWORK MANAGEMENT

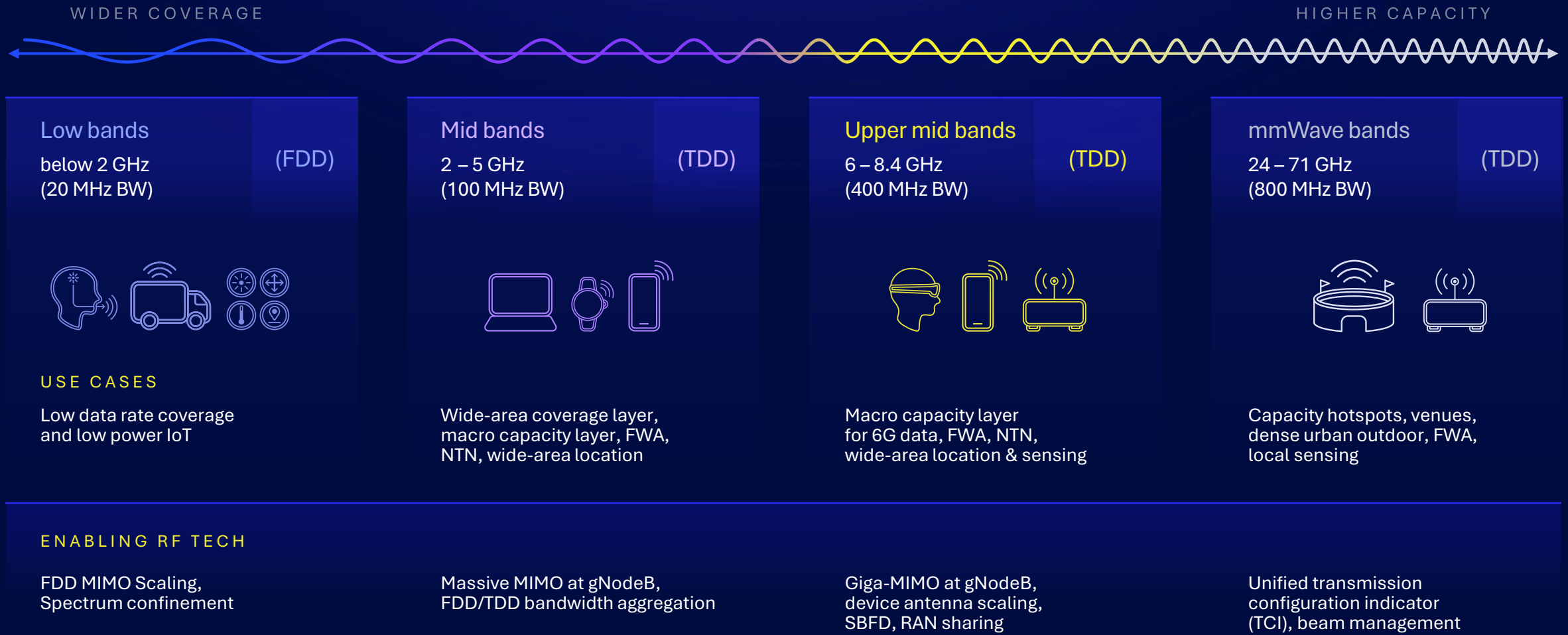
AI Inference-optimized



- Air-cooled cards
- Servers and racks
- RAN-optimized GPU servers and racks
- Agentic AI workloads

Driving capacity and coverage gains across all spectrum bands with 6G

Improving AI user experiences everywhere, not just peak throughputs



Qualcomm



Giga-MIMO

Radio unit based on Qualcomm infrastructure chipsets including QRU100, QTR185, and other RFFE solutions

CARRIER FREQUENCY 7-8 GHz

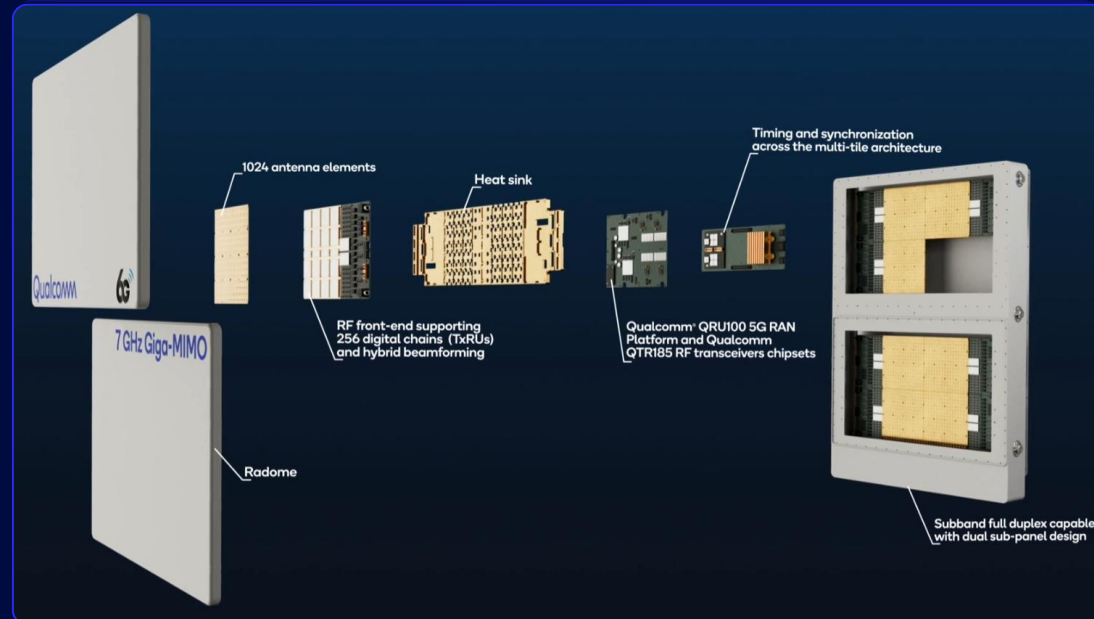
CHANNEL BANDWIDTH 400 MHz

ARRAY DIMENSION

1024 antennas with 256 transceivers

DUPLEXING

Sub-band full duplex and TDD capable





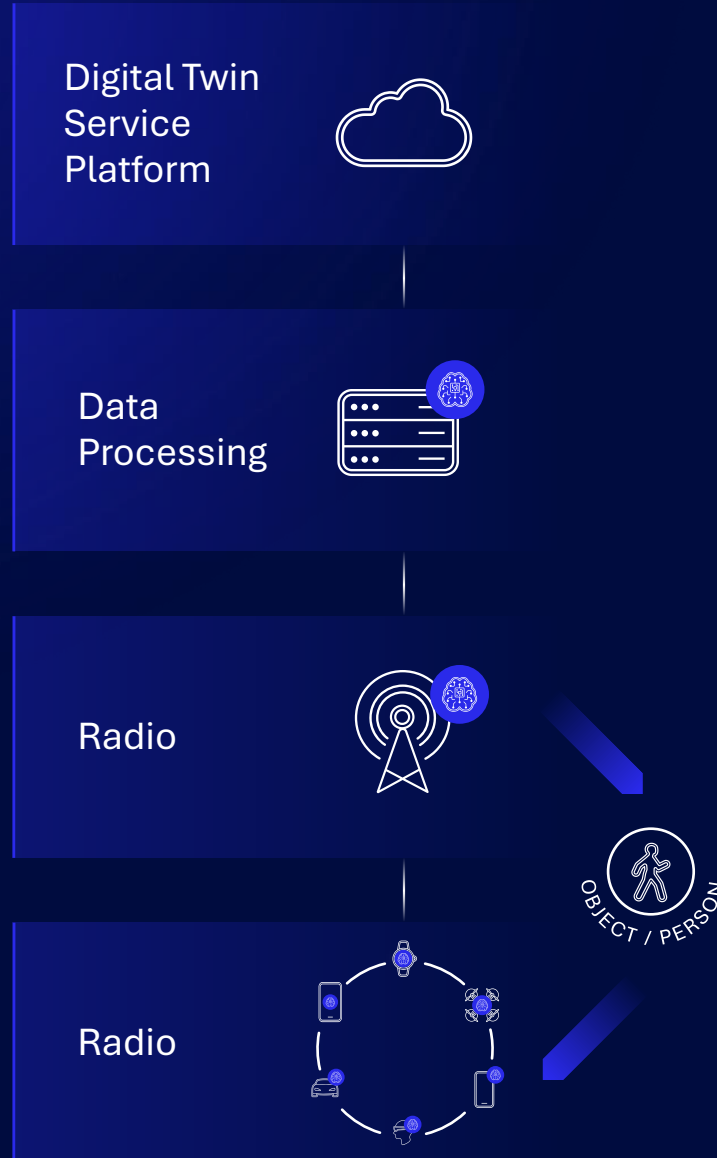
Integrated sensing and communication (ISAC) in 6G

Leverage existing network deployments

Utilize 6G wider-bandwidth and massive MIMO array to gain insights into real-time environment

Incorporate 6G device feedback

Include other sensor inputs (e.g., vision)



Digital Twin enabling diverse uses



Drone detection and tracking



Obstacle monitoring on roads/railways



Detecting and tracking automated guided vehicles (AGVs) and autonomous mobile robots (AMRs)



Intruder monitoring

ISAC: From feasibility to network-scale perception

6G scales ISAC for greater coverage and precision



Rel-19

Rel-20

Rel-21



ISAC channel-model foundation

- Scenario definitions
- Physical object / target models
- Multi-hop sensing channel model
- Channel model baseline set for Rel-20+ evaluations

gNB monostatic UAV sensing study

- 100 MHz max channel bandwidth
- Evaluate gNB / TRP monostatic UAV sensing
- Reuse 5G NR waveform and reference signals
- Define metrics, measurements and quantization
- Study RAN-CN signaling and gNB / Sensing Function architecture
- Assume full duplex-capable TRPs



Study: Expanded sensing modes, waveforms, and architecture

- Explore wider sensing bandwidths up to 400 MHz for greater coverage and precision
- Study all six TRP / UE sensing modes and combinations
- Evaluate UAV, vehicle, AGV and human use cases, and sensing-assisted communication
- CP-OFDM / 6GR frame as starting point; study reuse, enhanced and dedicated sensing reference signals
- Move toward standards-based, interoperable network-scale perception



SENSING MODES



TRP monostatic



TRP – TRP bistatic



TRP – UE bistatic



UE monostatic



UE – TRP bistatic

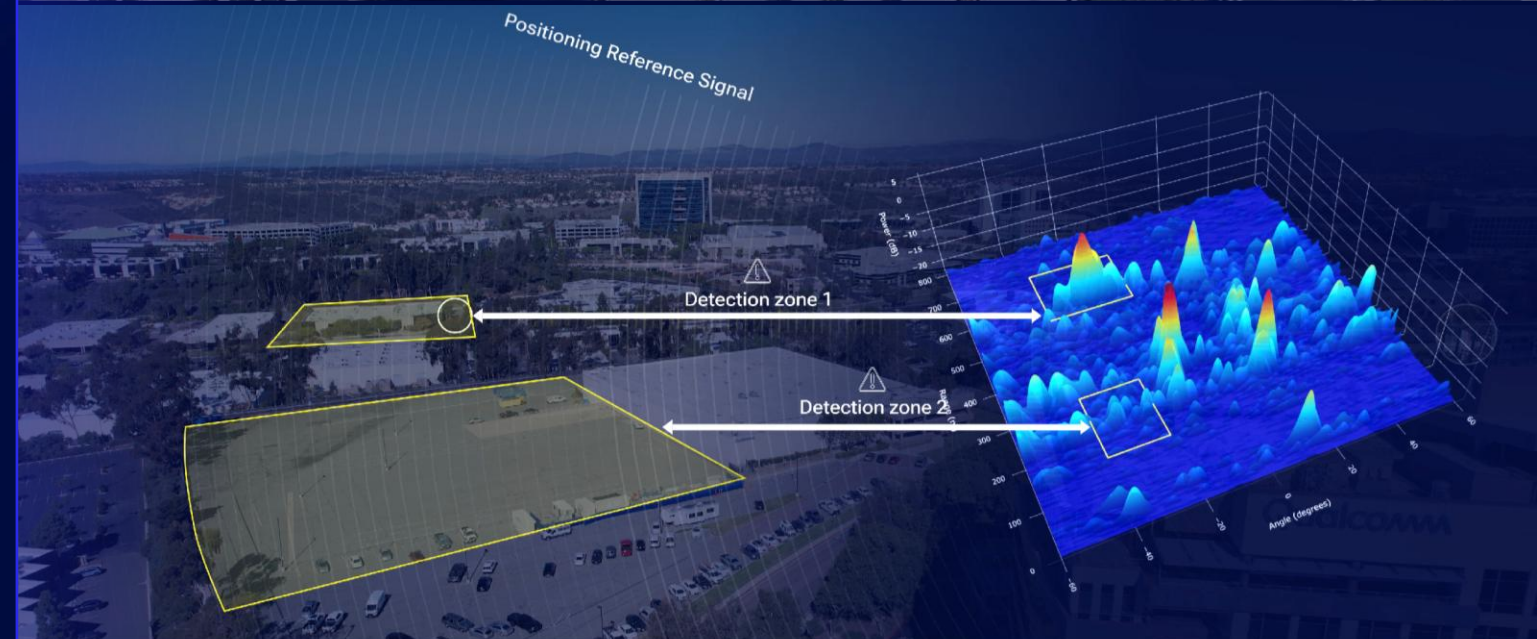
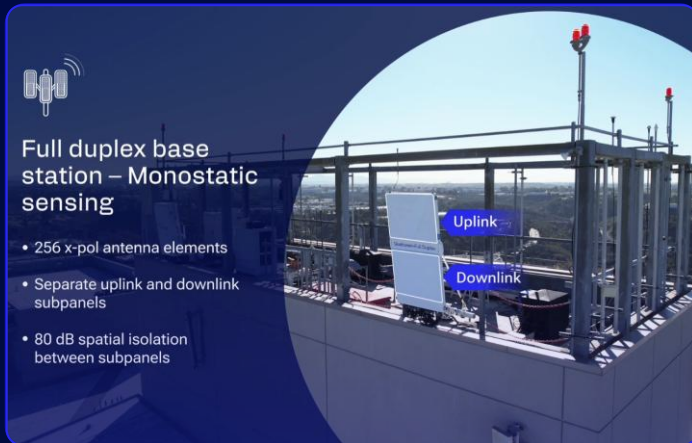


UE – UE bistatic

Demonstrating wide-area sensing

Detected moving aerial and ground objects over the air using sub-6 GHz spectrum

Classified drones using machine learning



6G can enable a real-time digital twin platform

Enable live network modelling and enabling new services

SMART CITY

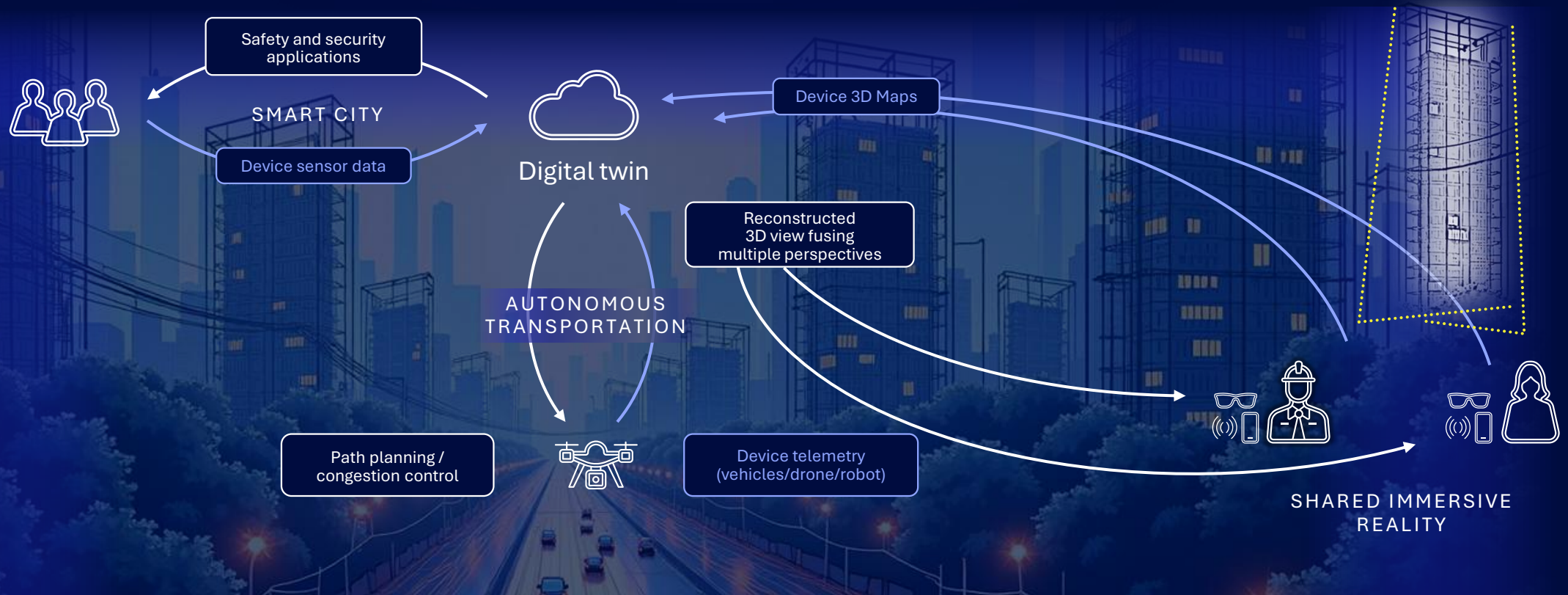
Incorporate device RF and sensing data
Enable environment and perimeter
safety and presence detection

AUTONOMOUS TRANSPORTATION

Incorporate vehicle/drone/robot telemetry
Enabling path planning,
congestion control and alerts

IMMERSIVE REALITY

Incorporate 3D maps from devices
Reconstruction of 3D environment
by fusing views across XR users



Thank you

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