

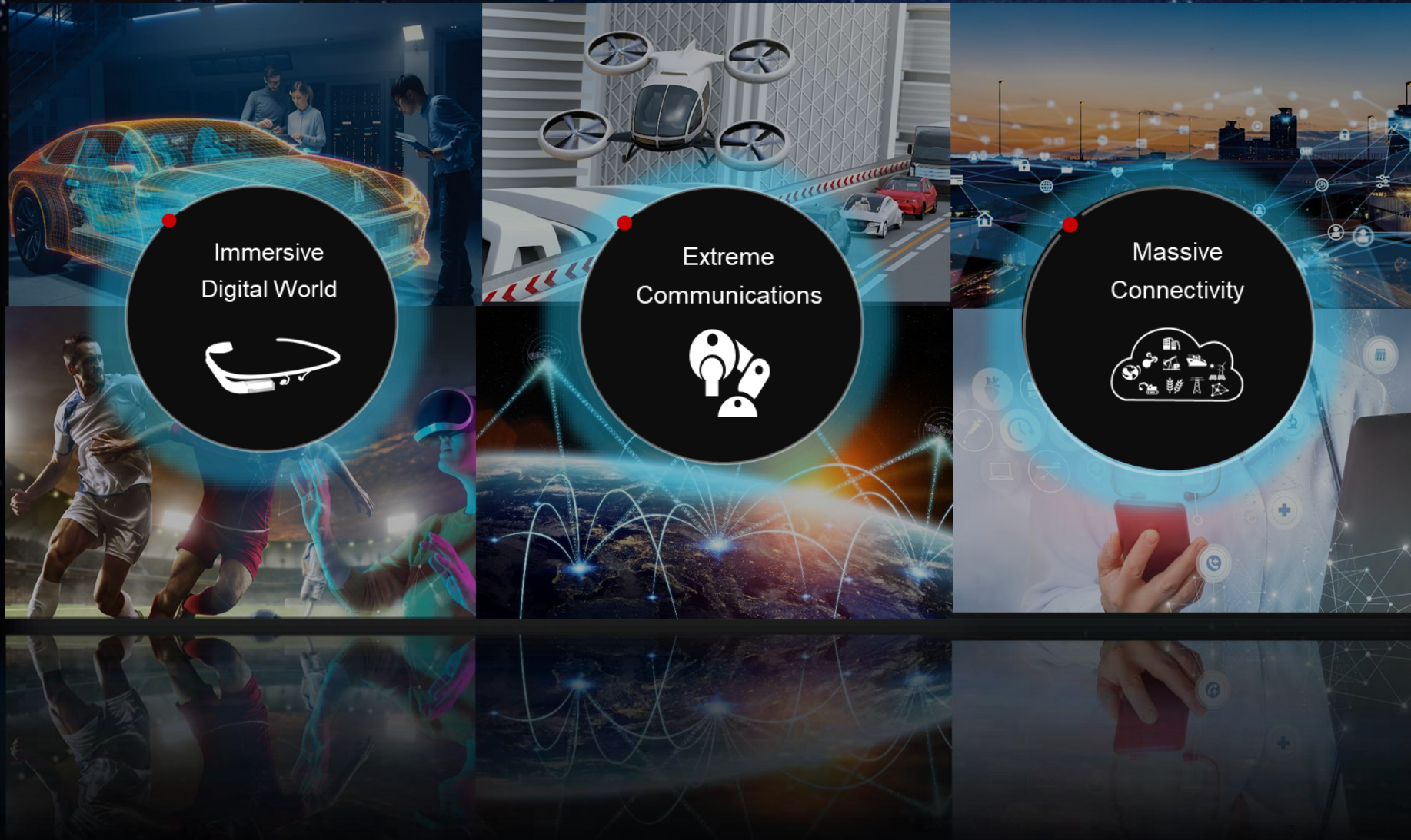
On the Convergence Route to 6G



Dr. Wen Tong
CTO, Huawei Wireless

2023 EuCNC & 6G Summit
Gothenburg, Sweden
June 9th, 2023

6G is for Enhanced Communications



6G is for Beyond Communications



6G: the Converged Vision



Feasibility and Practicality Validation



Driving toward a global standard



A GLOBAL INITIATIVE



USA

- ATIS;
- NG Alliance (2020.10)
- RINGS

UK

- 6GIC

EU

- Hexa-X: (2021.1)
- 6G IA
- SNS JU
- Verticals
- 5G-ACIA (2021.4)
- 5GAA (2021.4)
- One6G: (2021.3)
- ETSI: 6G-ISG

Germany

- 6G-ANNA: 德国6G旗舰项目 (2021.7)

Finland

- Oulu 6G Flagship (2018)

China

- IMT-2030:
- CCSA:

South Korea

- TTA: 6G vision WS
- 5G Forum
- KICS

Japan

- B5GPC
- IOWN

2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

Vision/Usage/KPI/Timeline

Study

Specifications

WRC-19
5G Spectrum

WRC-23
Discuss 6G Spectrum




WRC-27
Allocate 6G Spectrum

MIMO Revolution and Evolution



Integrated Sensing and Communications

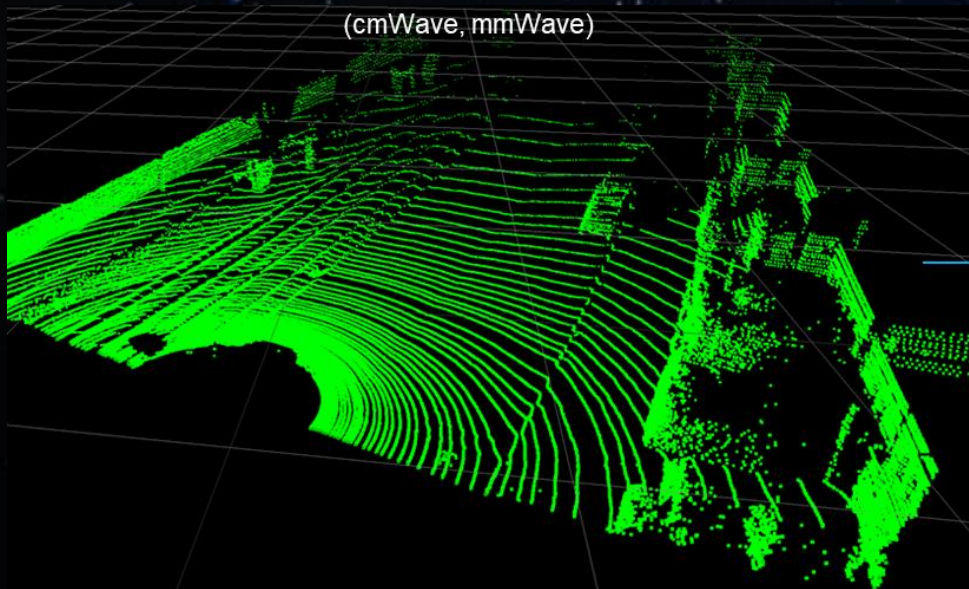


-  Data Link
-  Bidirectional Sensing
-  Unidirectional Sensing

NLOS joint sensing with gNB and UE

cmWave/mmWave ISAC

6G Point Cloud
(cmWave, mmWave)



Radio Rendering
Processing



Ground Truth



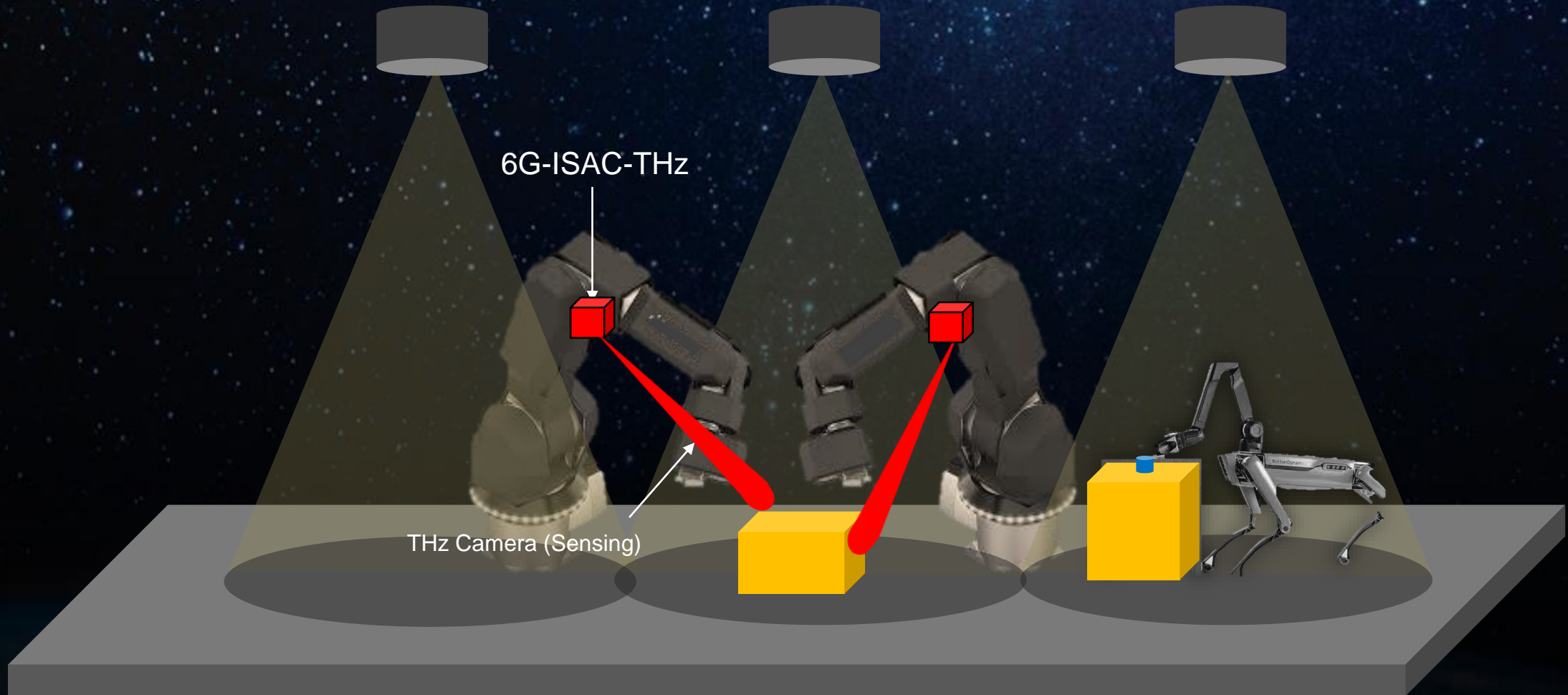
Network Wide ISAC



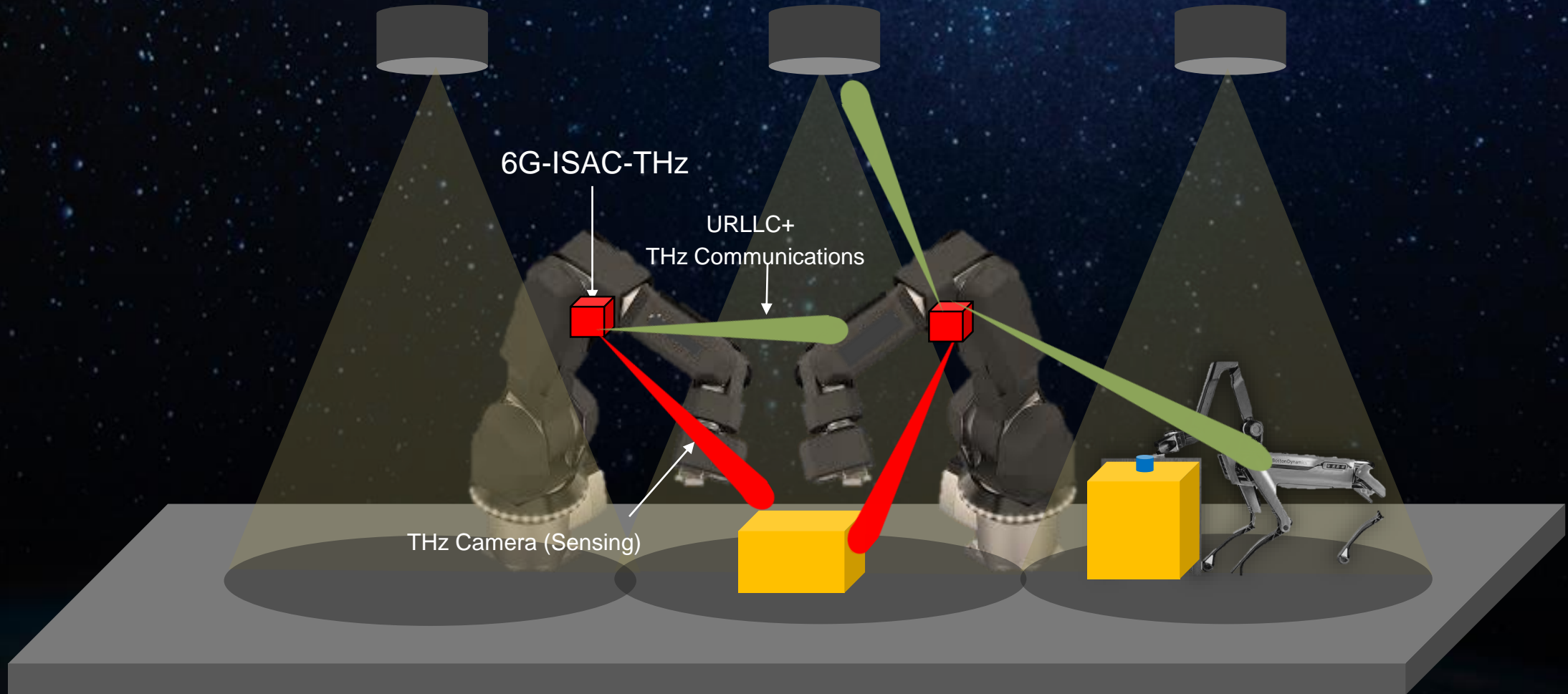
NLOS joint sensing with gNB and UE



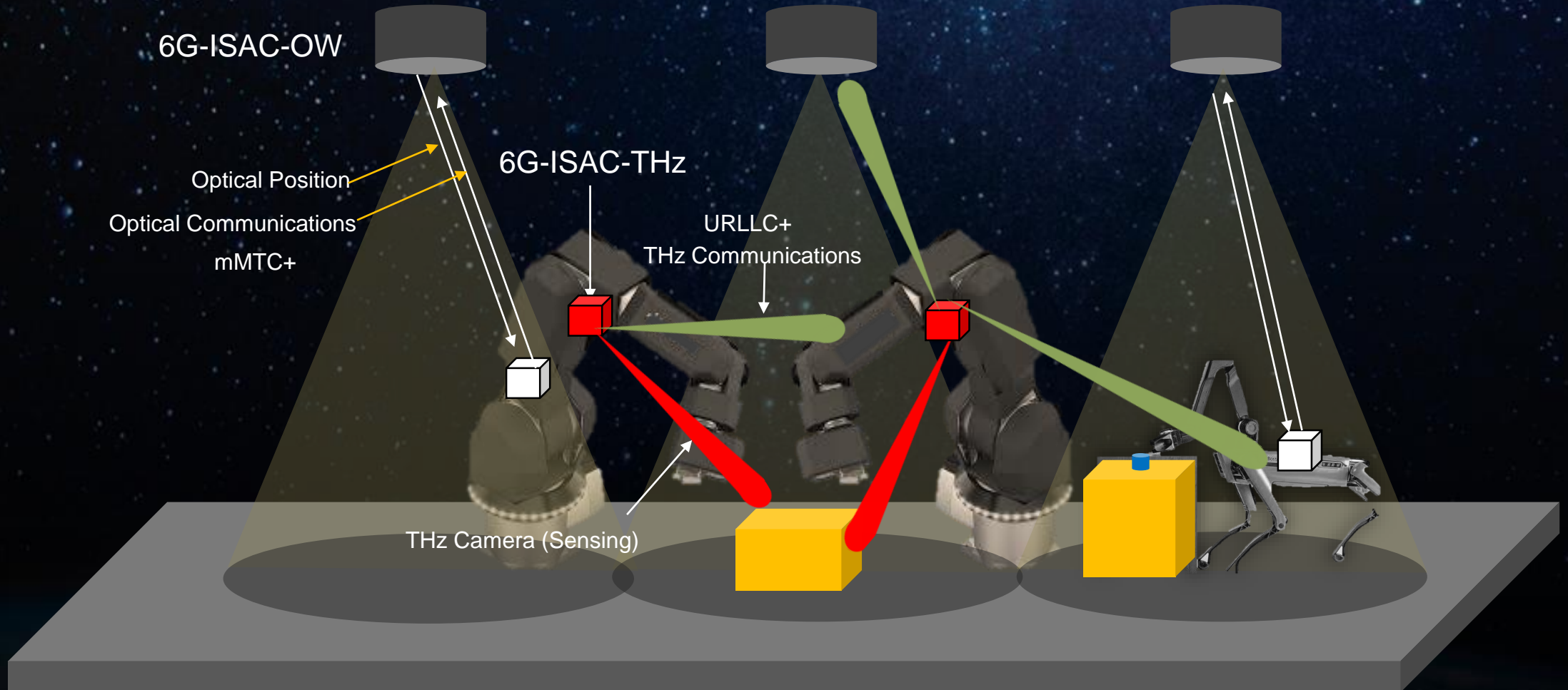
6G ISAC Enabled Industry IoT



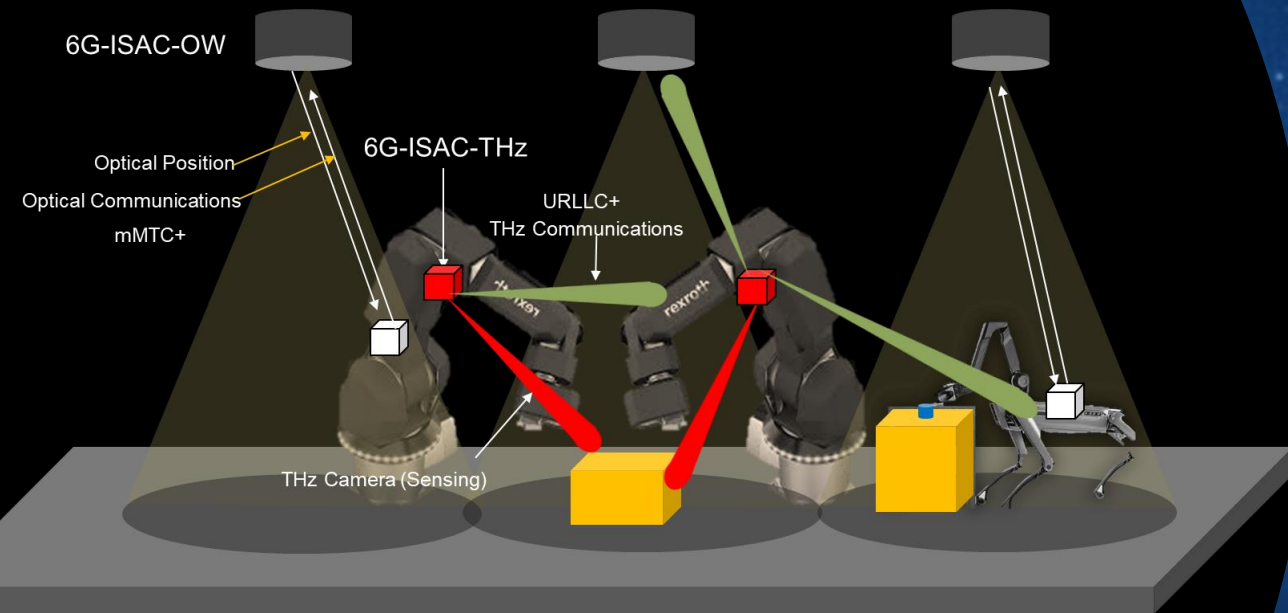
6G ISAC Enabled Industry IoT



6G ISAC Enabled Industry IoT

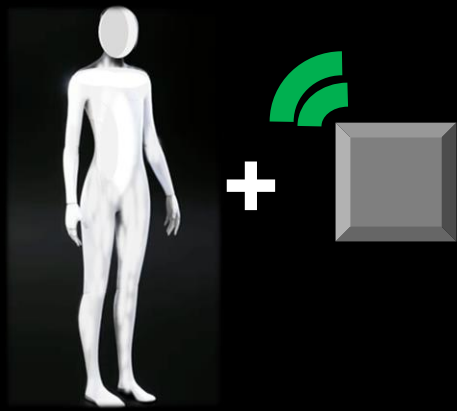


6G ISAC for 2B Devices

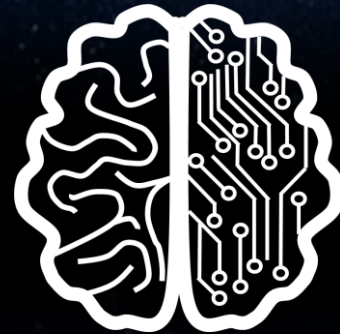


6G ISAC for 2C Consumers

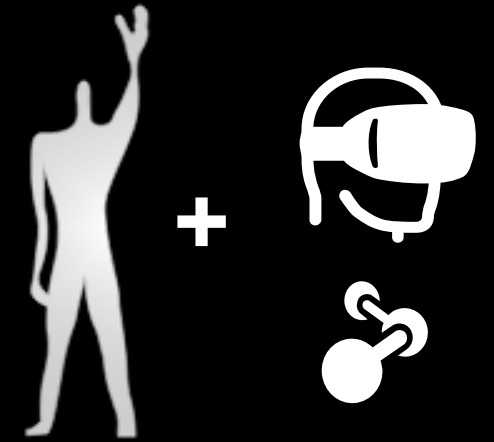
The Make of General Purpose Robot



Robot Butler
(URLLC) **6G**
(ISAC)



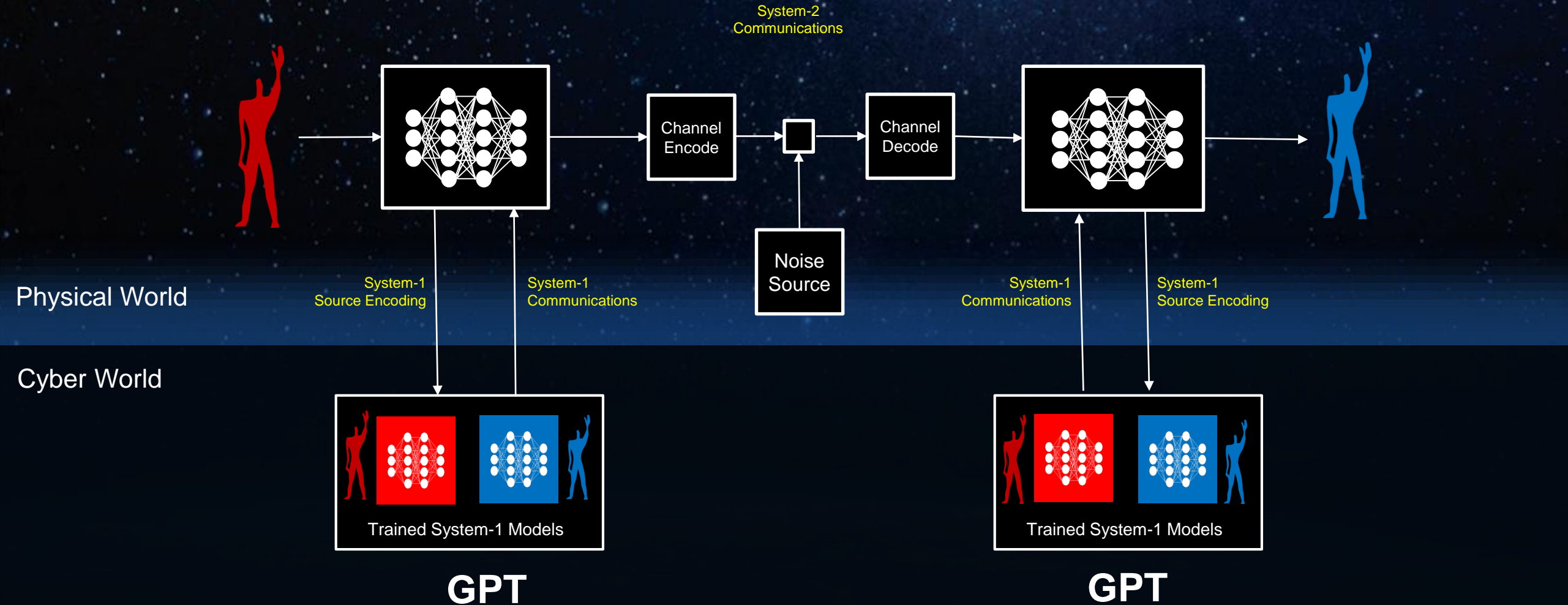
AI Brain
(Cloud)



Human
(URLLC) **6G**
(URLLC)

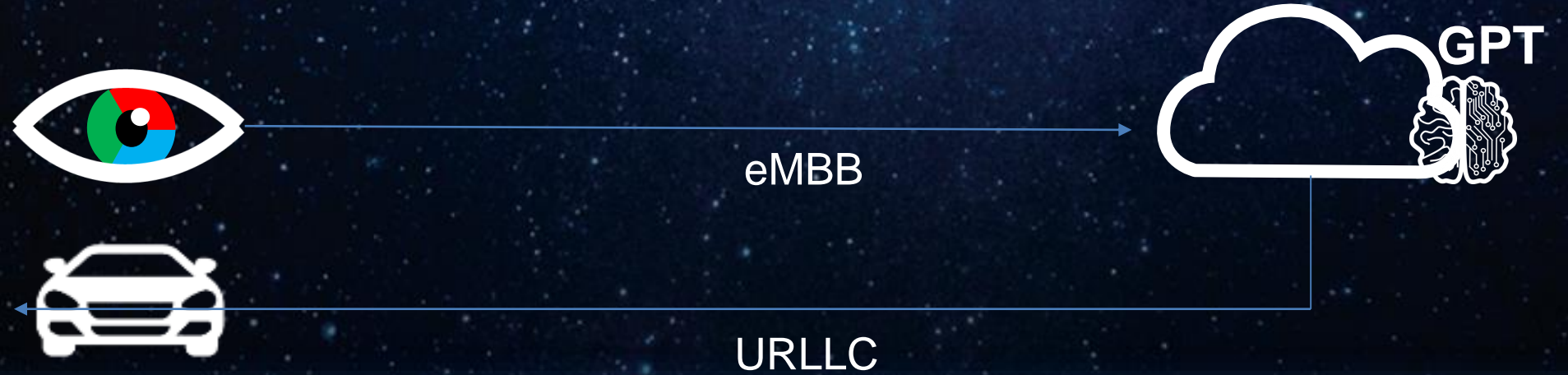
AI Communications Architecture

New Communications Model Based on Machine Learning



M2M Communications

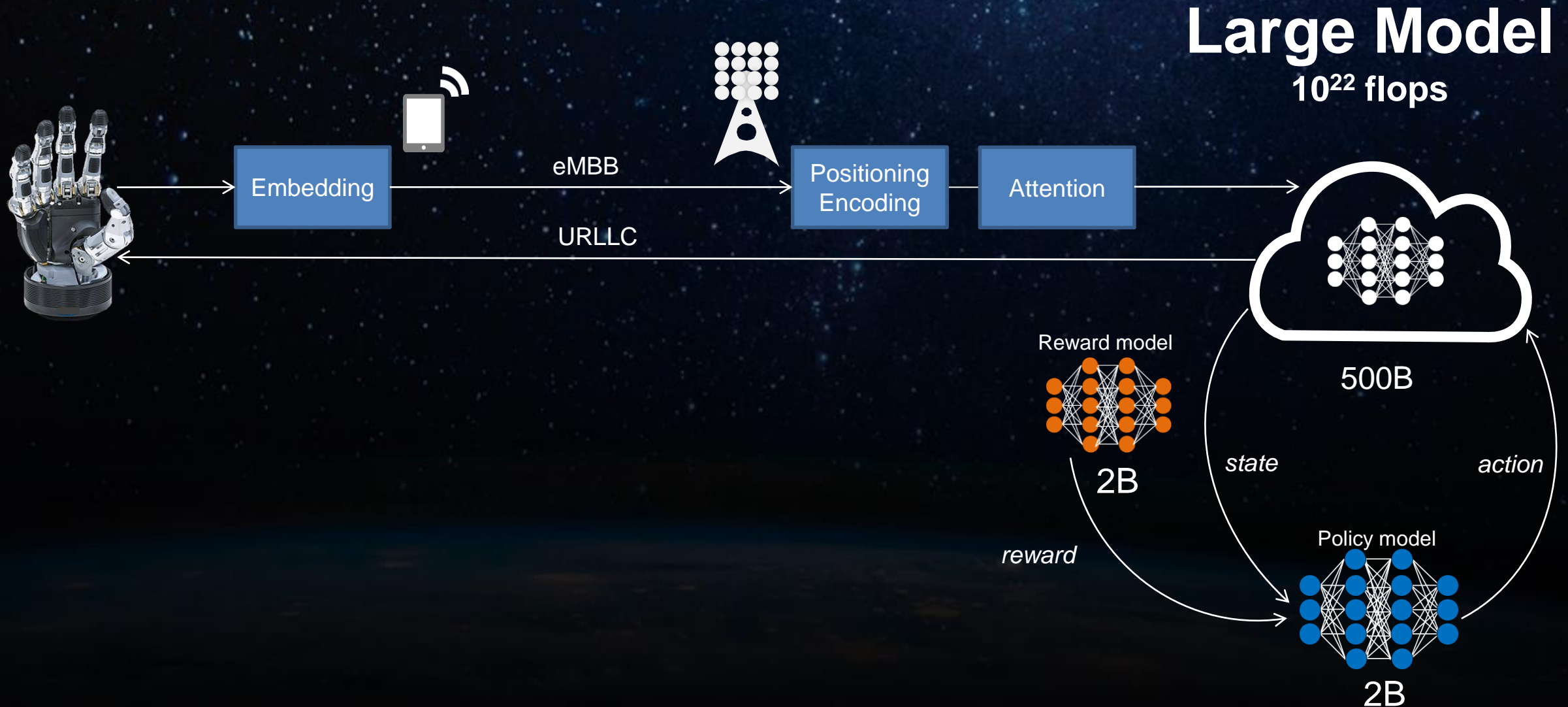
5G



6G

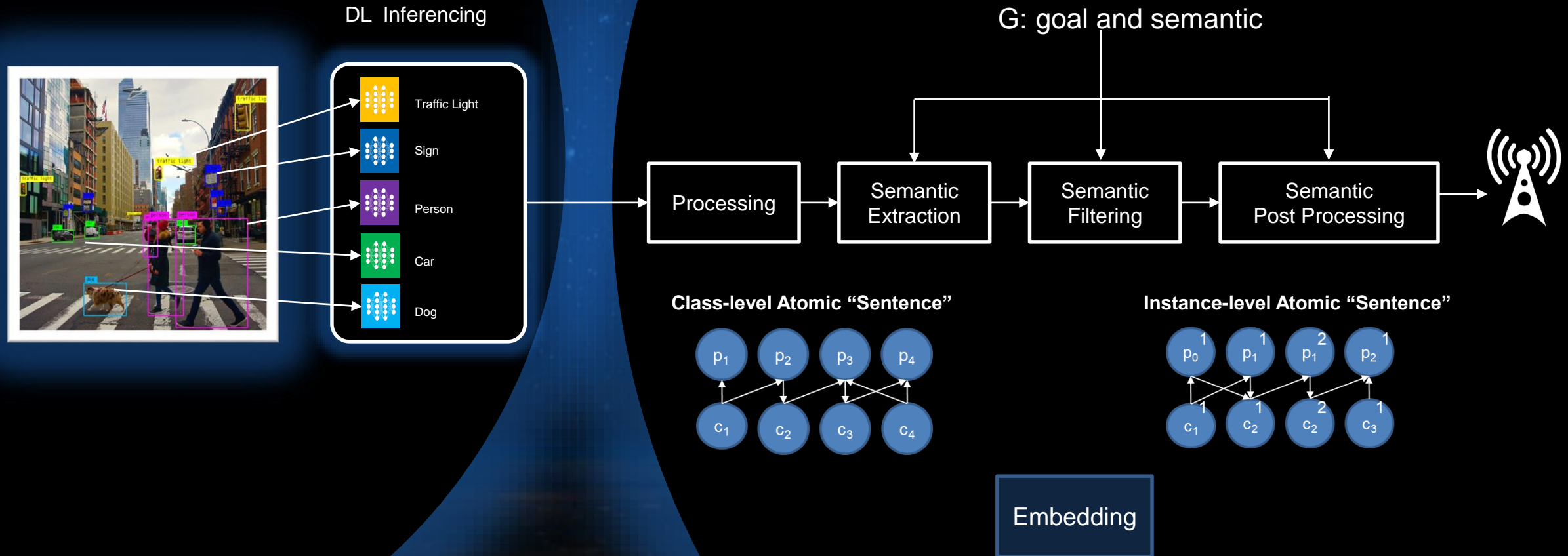


MachineGPT and Effectiveness Communications



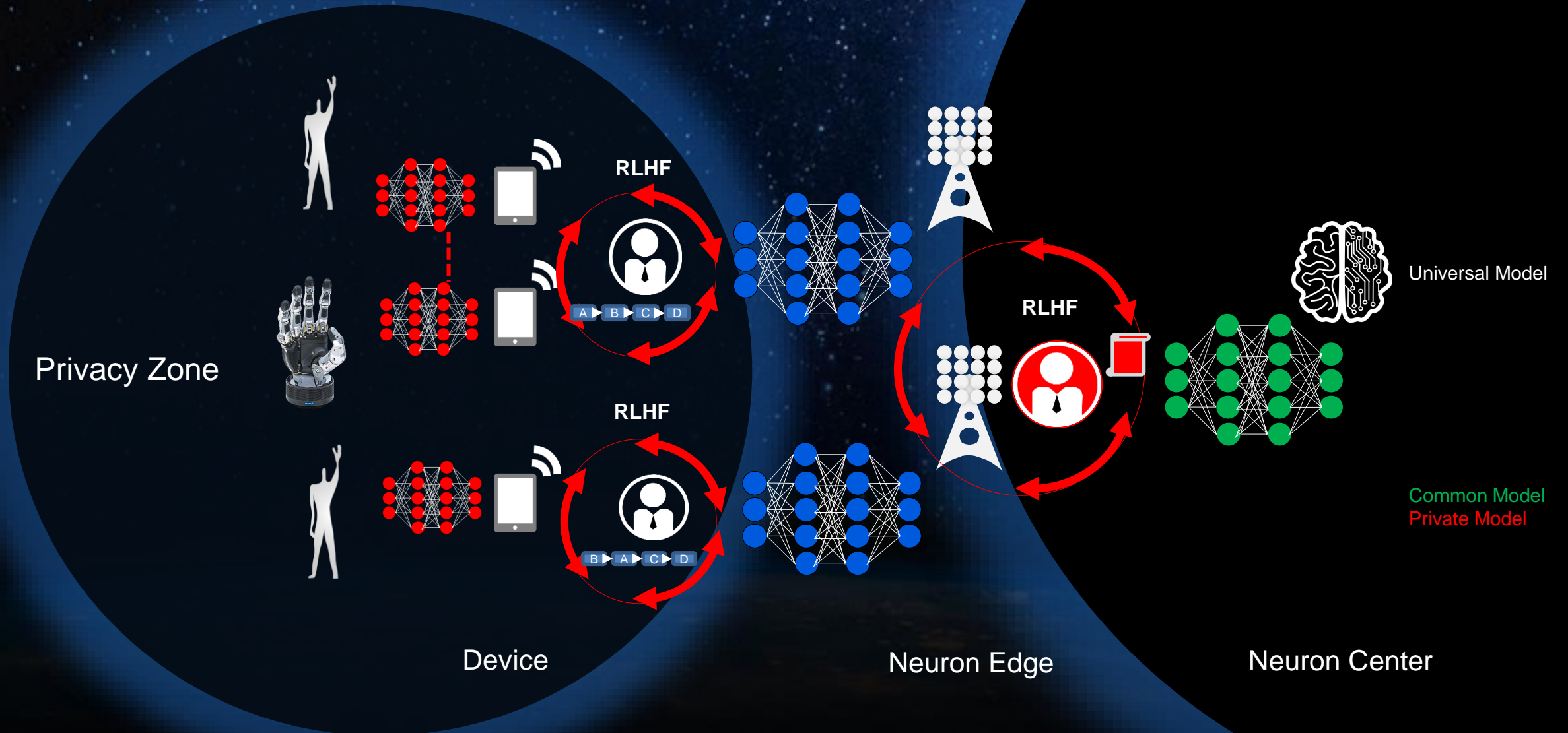
6G Effectiveness Communications

UE front-end processing



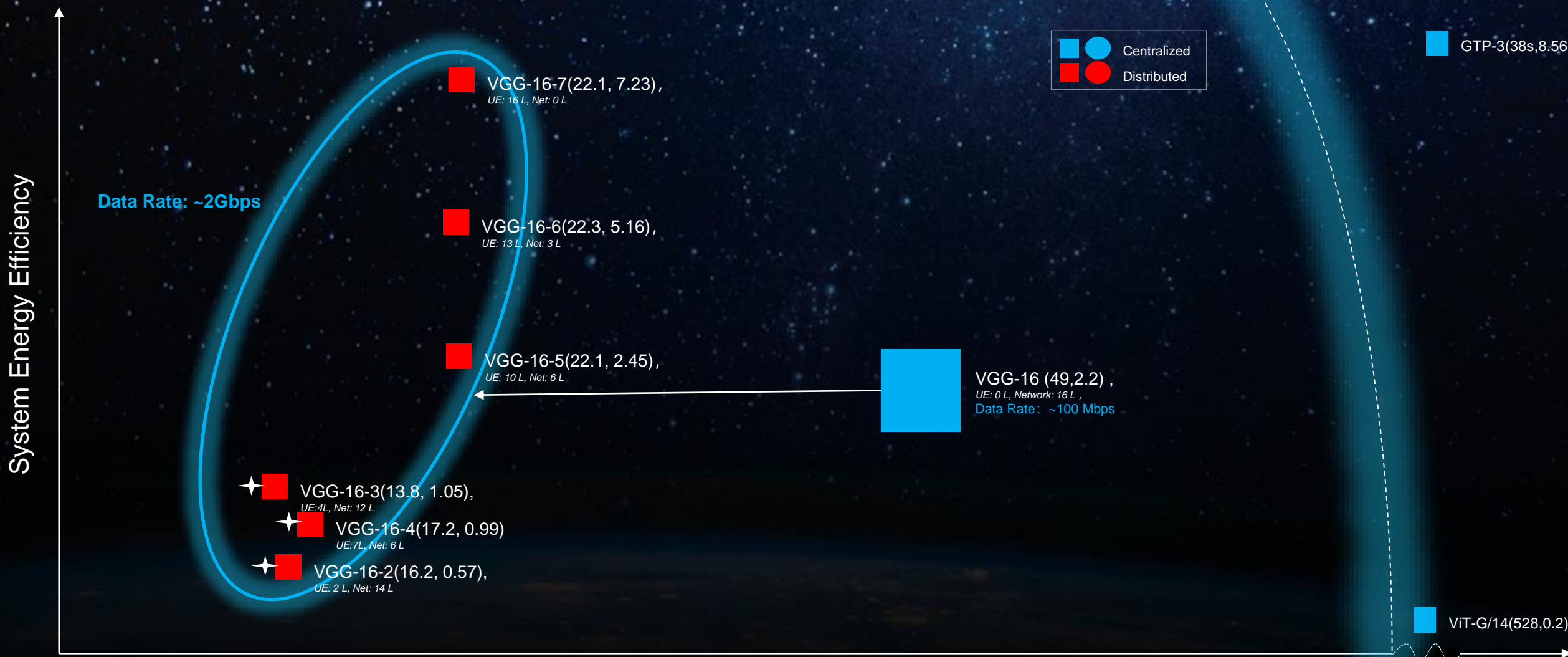
6G Networked Learning Architecture

Crowd Sourcing to Train AI Model



6G Native-AI Networks Merits

Comparison of Inference Service KPI (Distributed vs. Centralized)

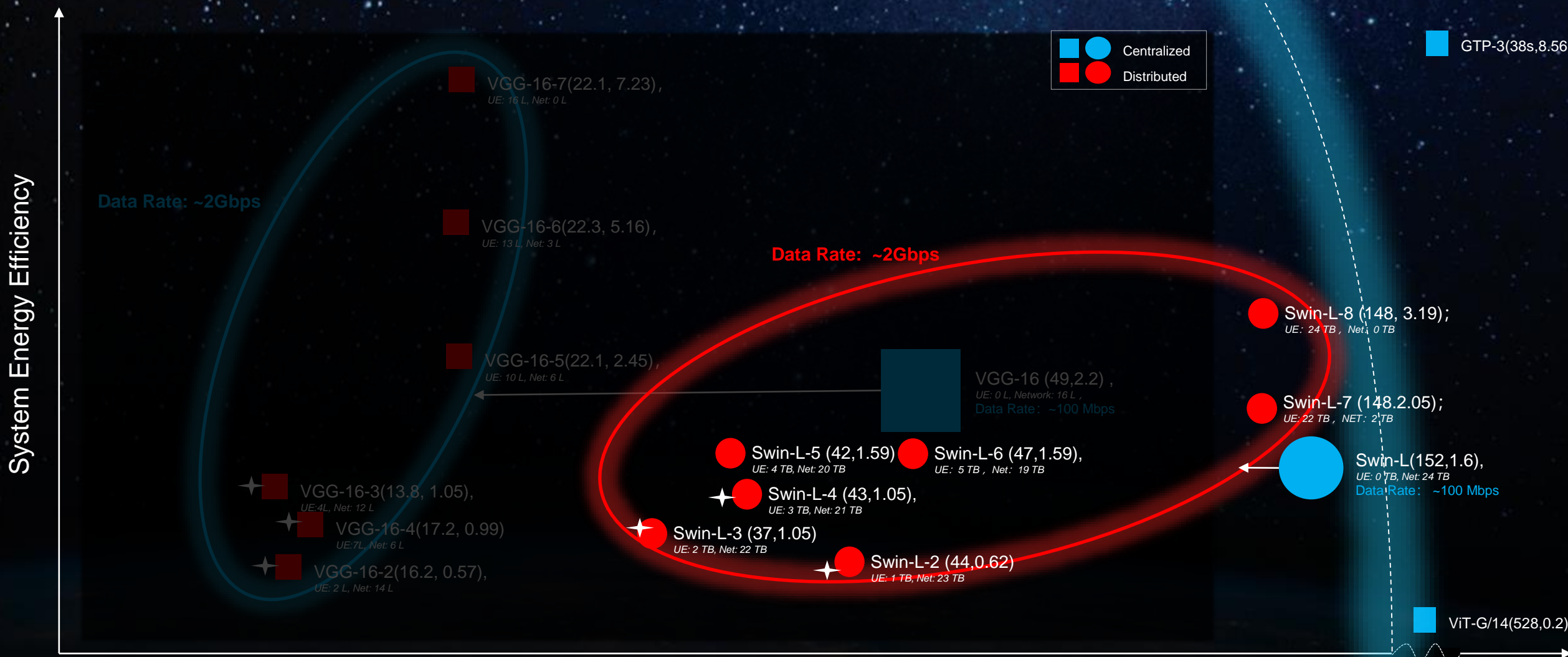


L: 13 Conv Layers + 3 full connection Layers for VGG 16
 TB: 24 transformer blocks in total for Swin-L Model

Service Response Latency (ms)

6G Native-AI Networks Merits

Comparison of Inference Service KPI (Distributed vs. Centralized)

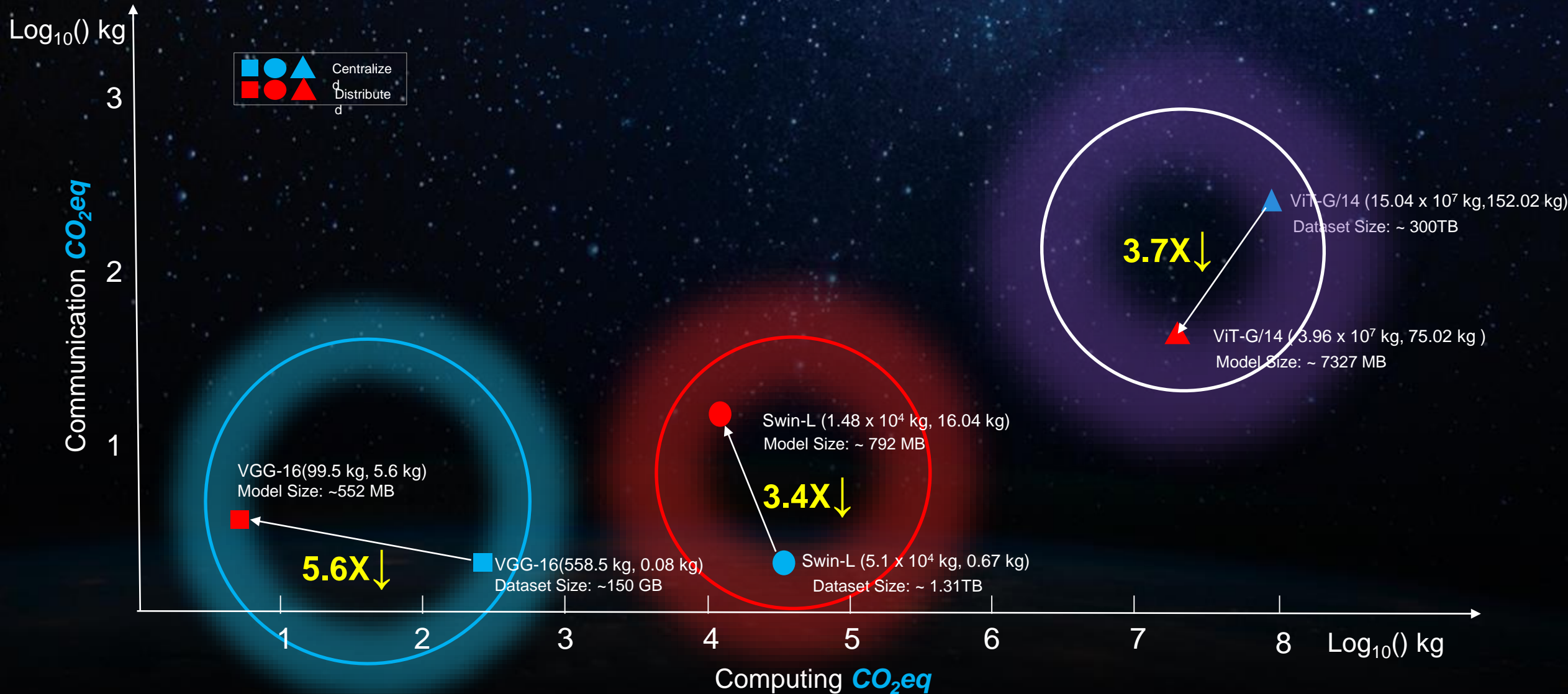


L: 13 Conv Layers + 3 full connection Layers for VGG 16
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Service Response Latency (ms)

6G Native-AI Networks Merits

Comparison of Training Service KPI (Distributed vs. Centralized)



6G Investment Timeline



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Thank You.

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