

6G[»]
FLAGSHIP

URLLC key enablers for 5G and beyond systems

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Abstract

URLLC is an inherent part of 5G and is the communication mode that imposes the **greatest technical challenges for 5G and beyond** systems.



Vision for 2030

Our society is data-driven,
enabled by near-instant,
unlimited wireless connectivity.

6G will emerge around 2030 to satisfy the expectations not met with 5G, as well as, the new ones fusing AI inspired applications in every field of society with ubiquitous wireless connectivity.

2030



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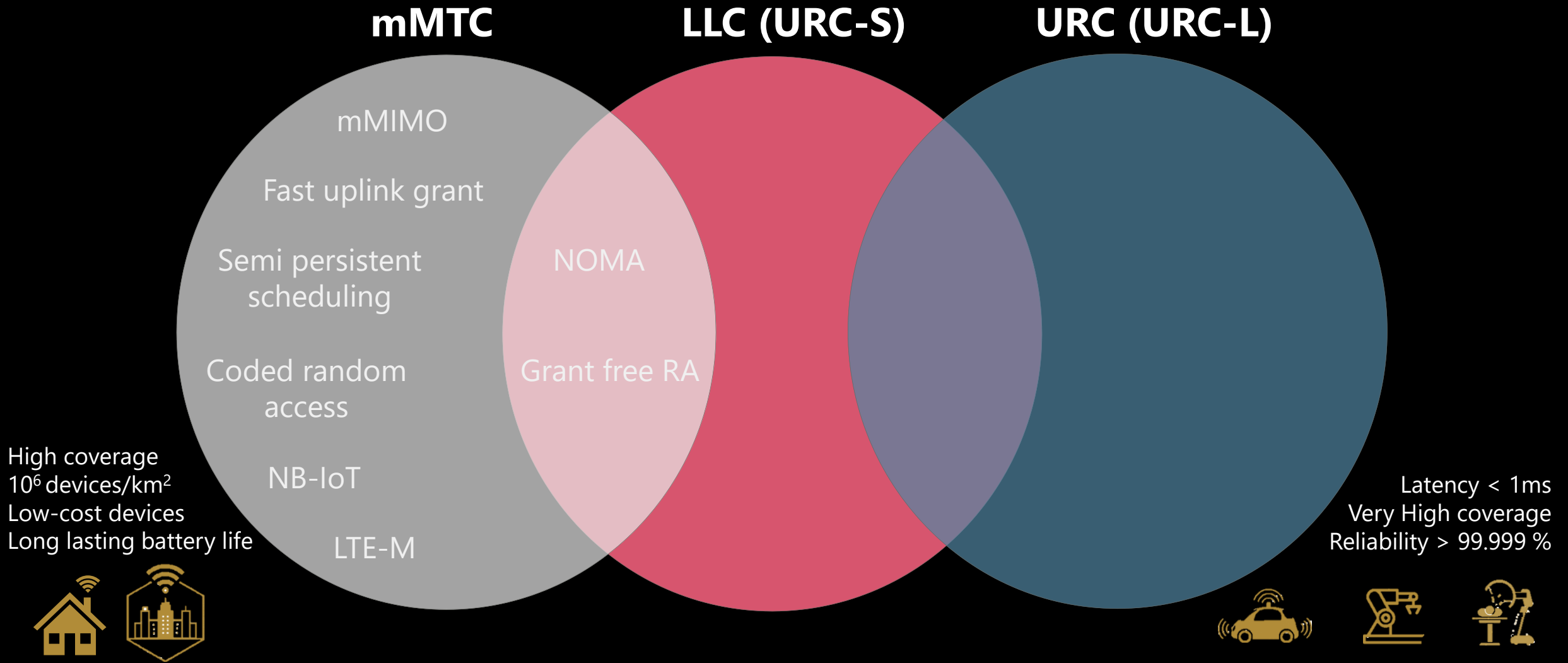
Abstract

Even though some advancements have been made with 5G NR, we are **still far from enabling that vision.**

What are the **URLLC enablers for 5G and beyond systems** and their associated challenges?

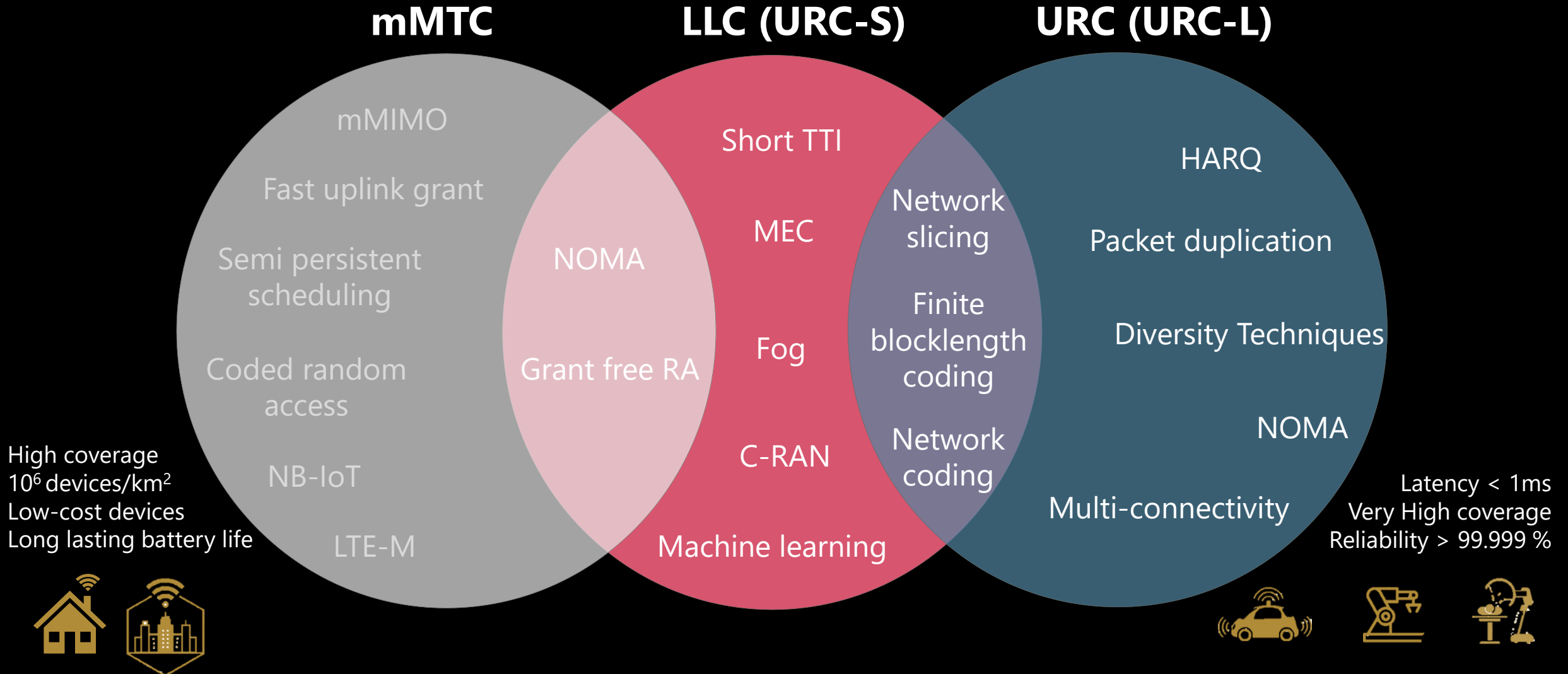


MTC for 5GB



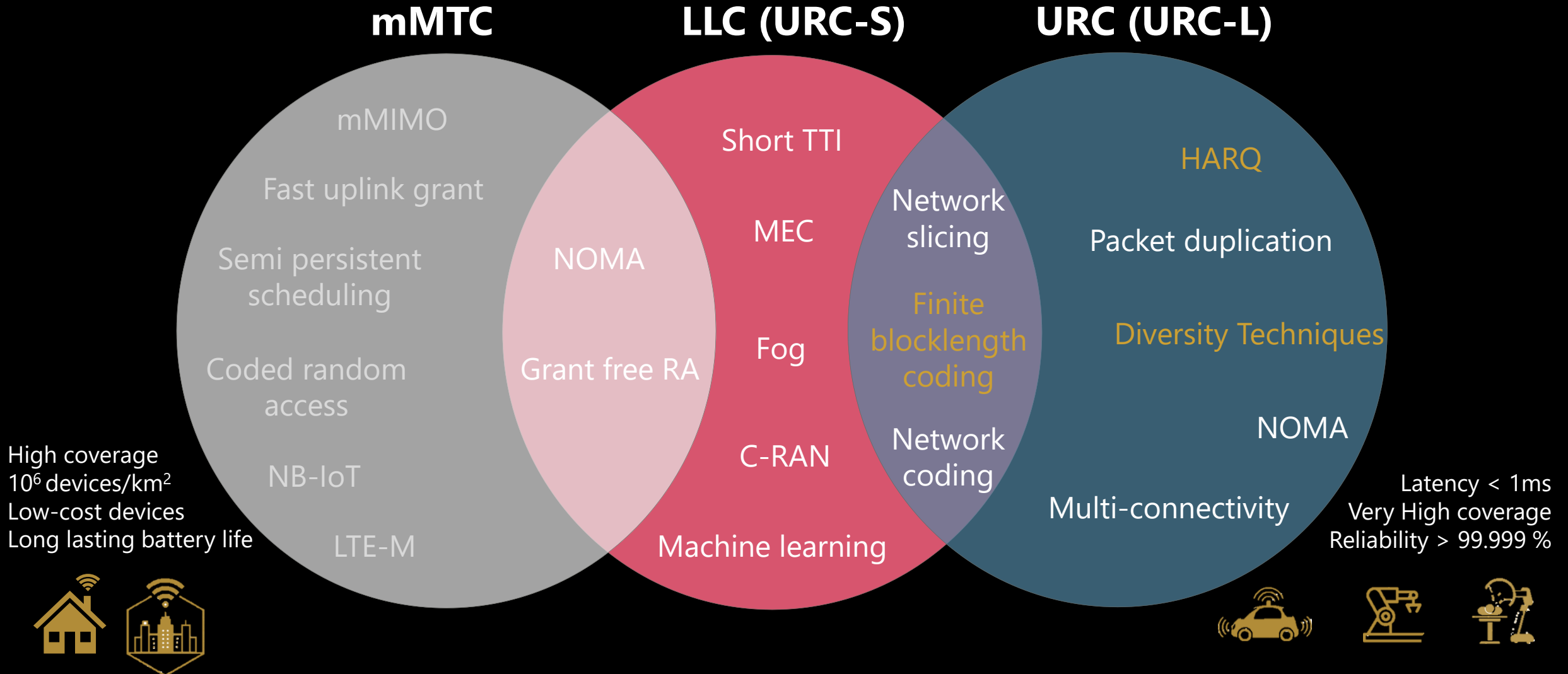


MTC for 5GB





MTC for 5GB

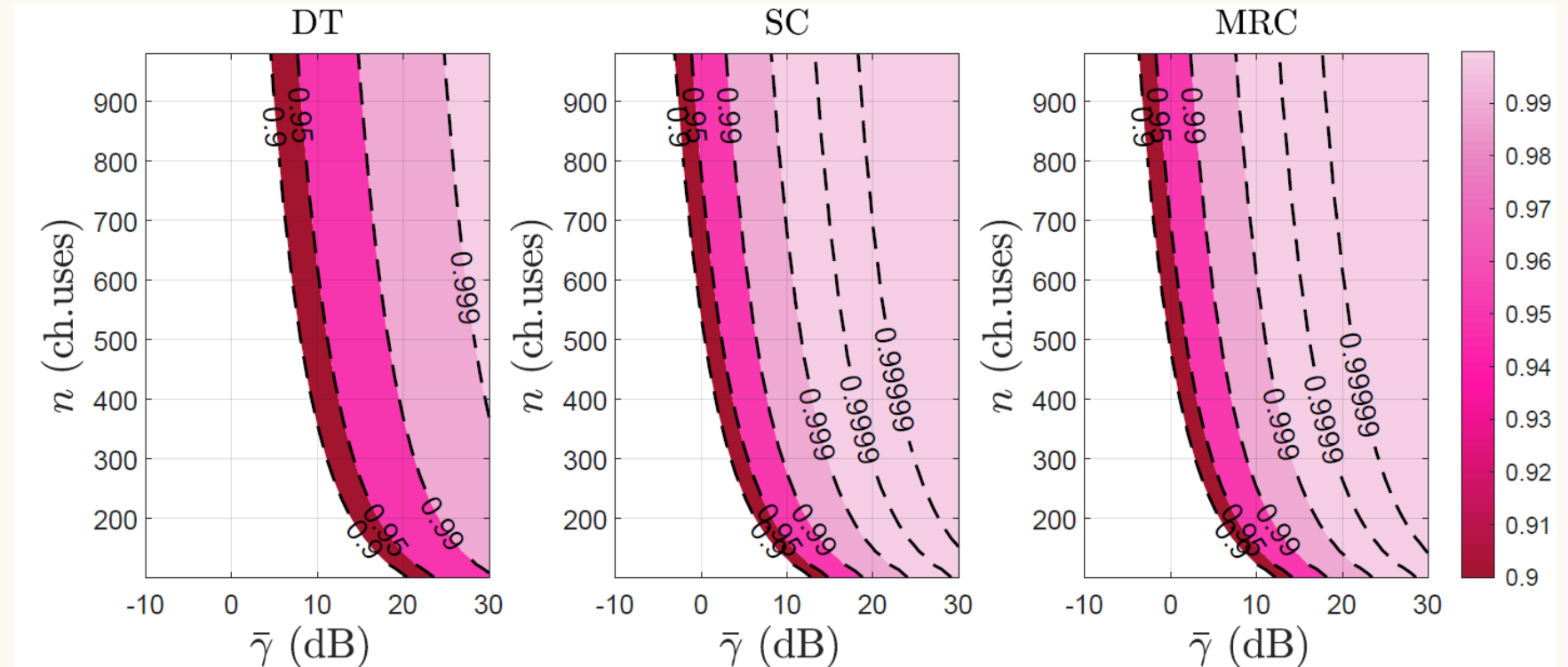


Diversity Techniques

Cooperative Diversity (HARQ)

Finite Blocklength Coding

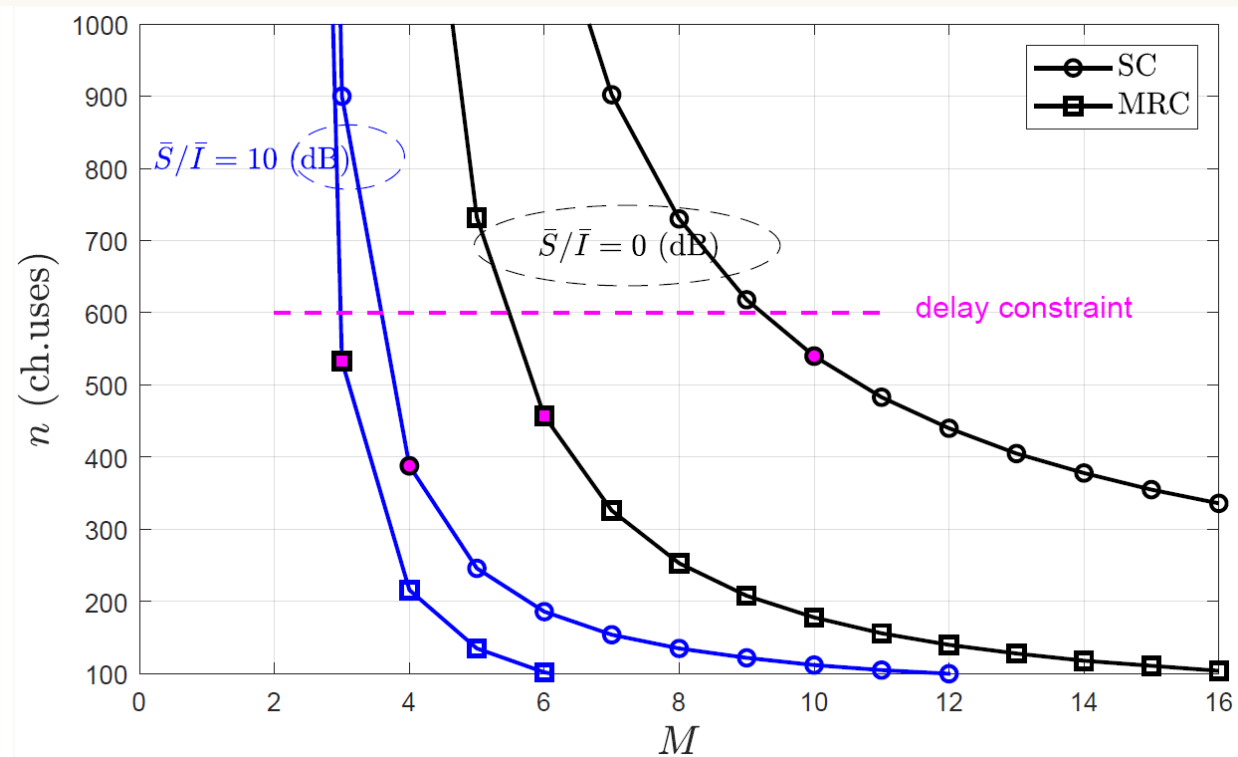
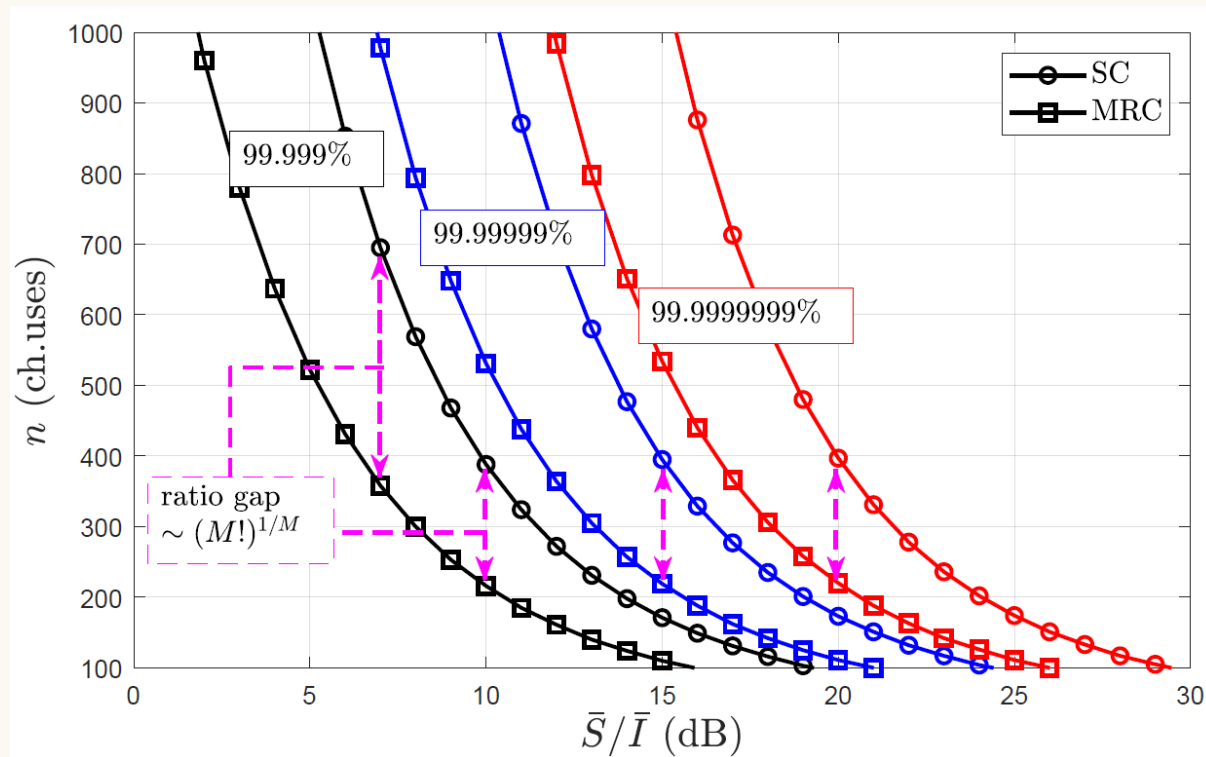
- 32 bytes payload
- 99.999% reliability



P. Nouri, H. Alves, M. Latva-aho, "Performance Analysis of Ultra-Reliable Short Message Decode and Forward Relaying Protocols", EURASIP Journal on Wireless Communications and Networking, pp. 1-10, vol 2018, no 194, Aug 2018.

Diversity Techniques

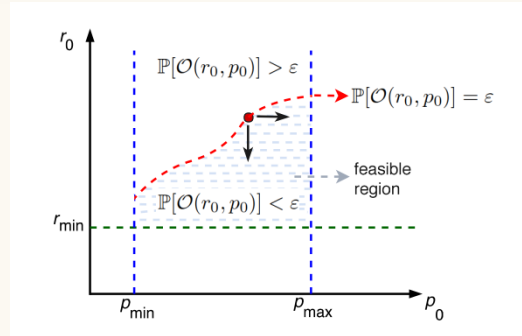
MIMO & FBC



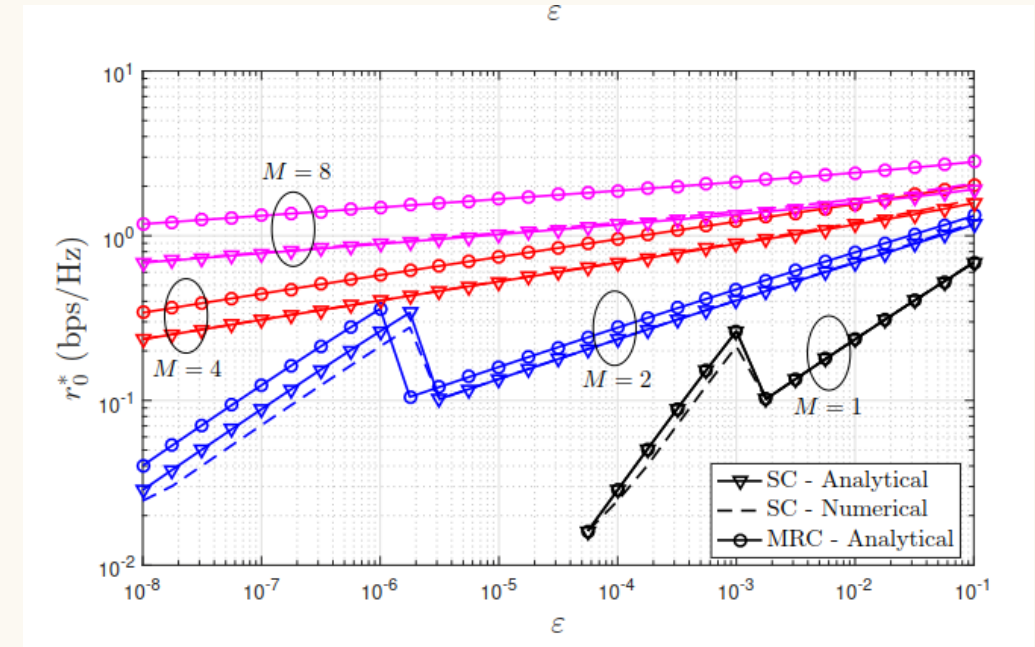
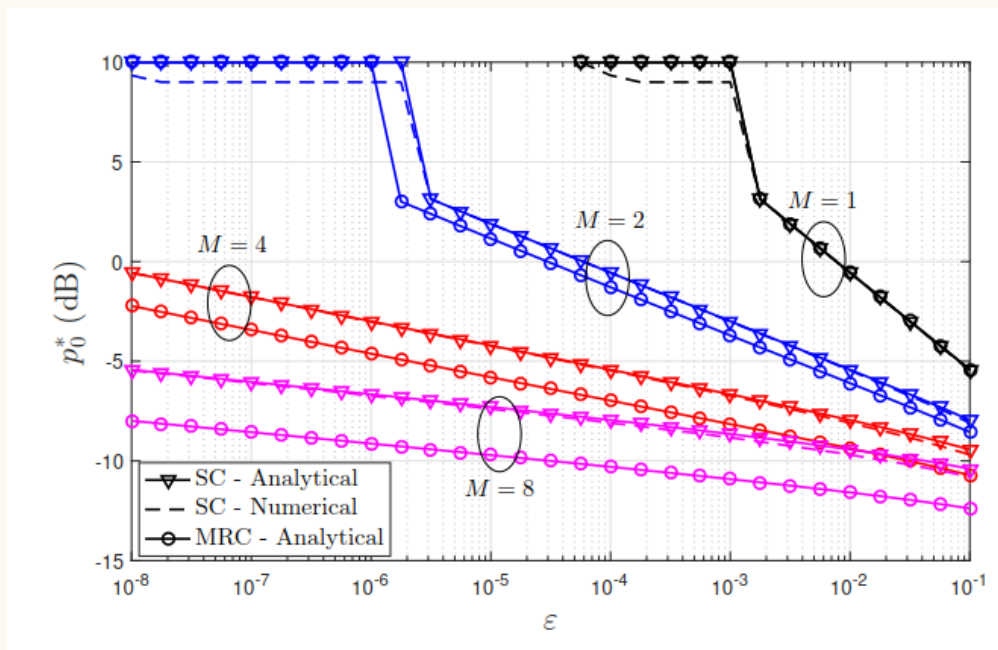
Diversity Techniques

MIMO & FBC

Rate and Power Control



Robust QoS guarantees



O. L. A. López, H. Alves, and Matti Latva-aho, "Joint Power Control and Rate Allocation enabling Ultra-Reliability and Energy Efficiency in SIMO Wireless Networks," TCOM (cond. Accepted.).



Challenges ahead

- Diversity (cooperative, spatial,...)
- Multi-connectivity
 - Meet 32 bytes & 99.999% reliability
- Deterministic QoS
- High reliability under strict latency
- High Coverage & availability

Kiitos!
Thanks!
Obrigado!



**MTC
Group**

<https://sites.google.com/view/hirley-alves/group>

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