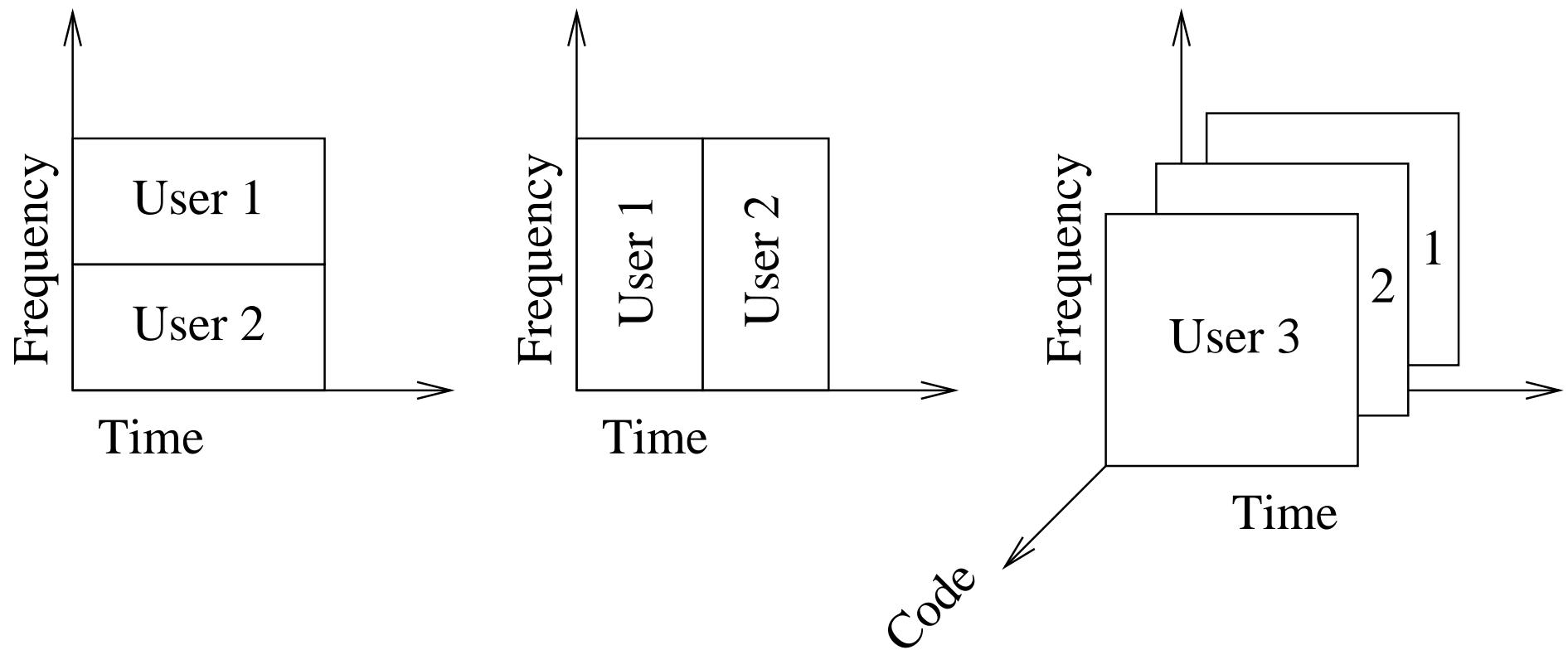


# **Non-Orthogonal Multiple Access for 5G and Beyond**

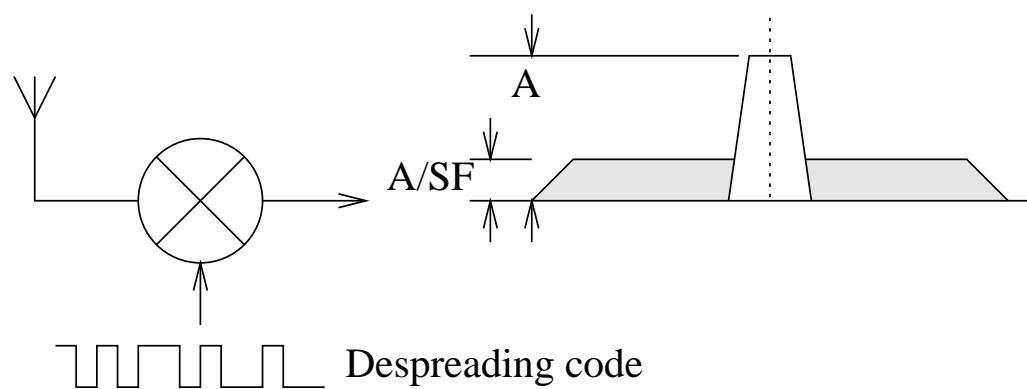
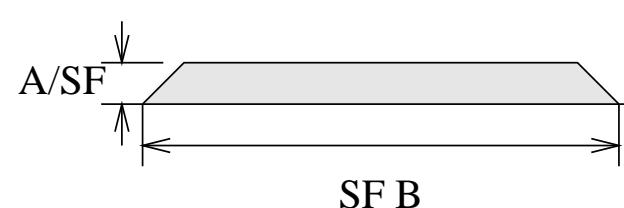
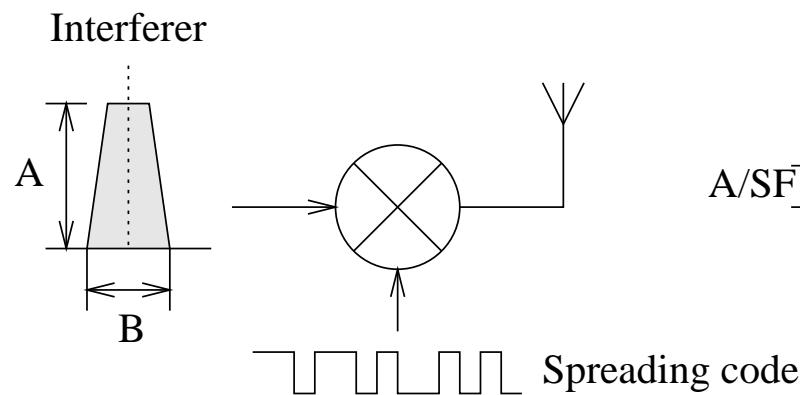
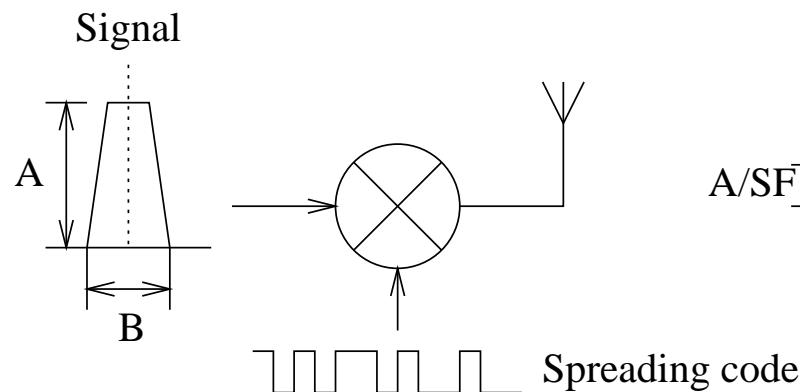
**Proceedings of the IEEE, Dec. 2017**

**by  
Yuanwei Liu, Zhijin Qin, Maged Elkashlan,  
Zhiguo Ding, Arumugam Nallanathan and  
Lajos Hanzo**

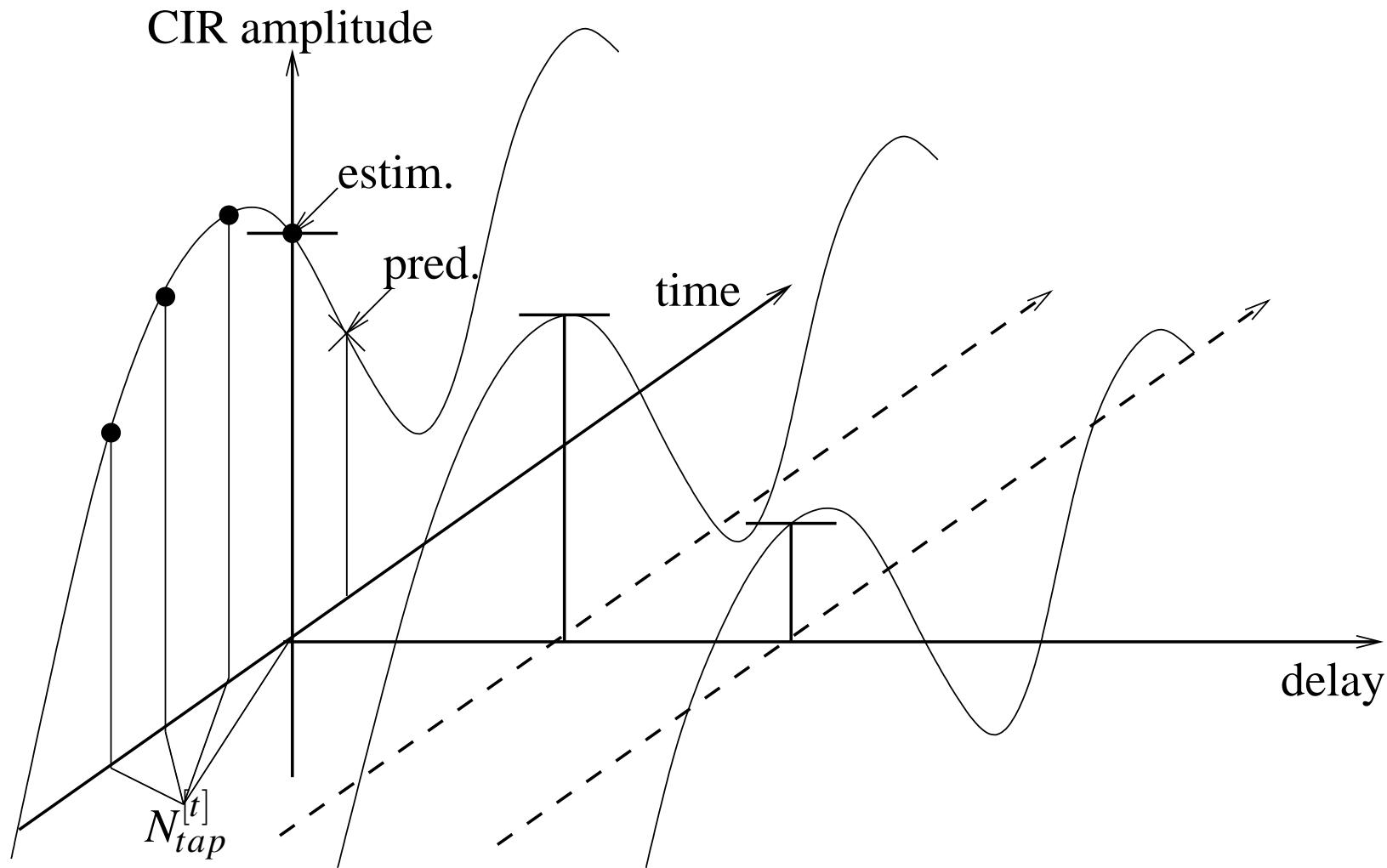
# Orthogonal multiple access schemes: FDMA, TDMA and CDMA



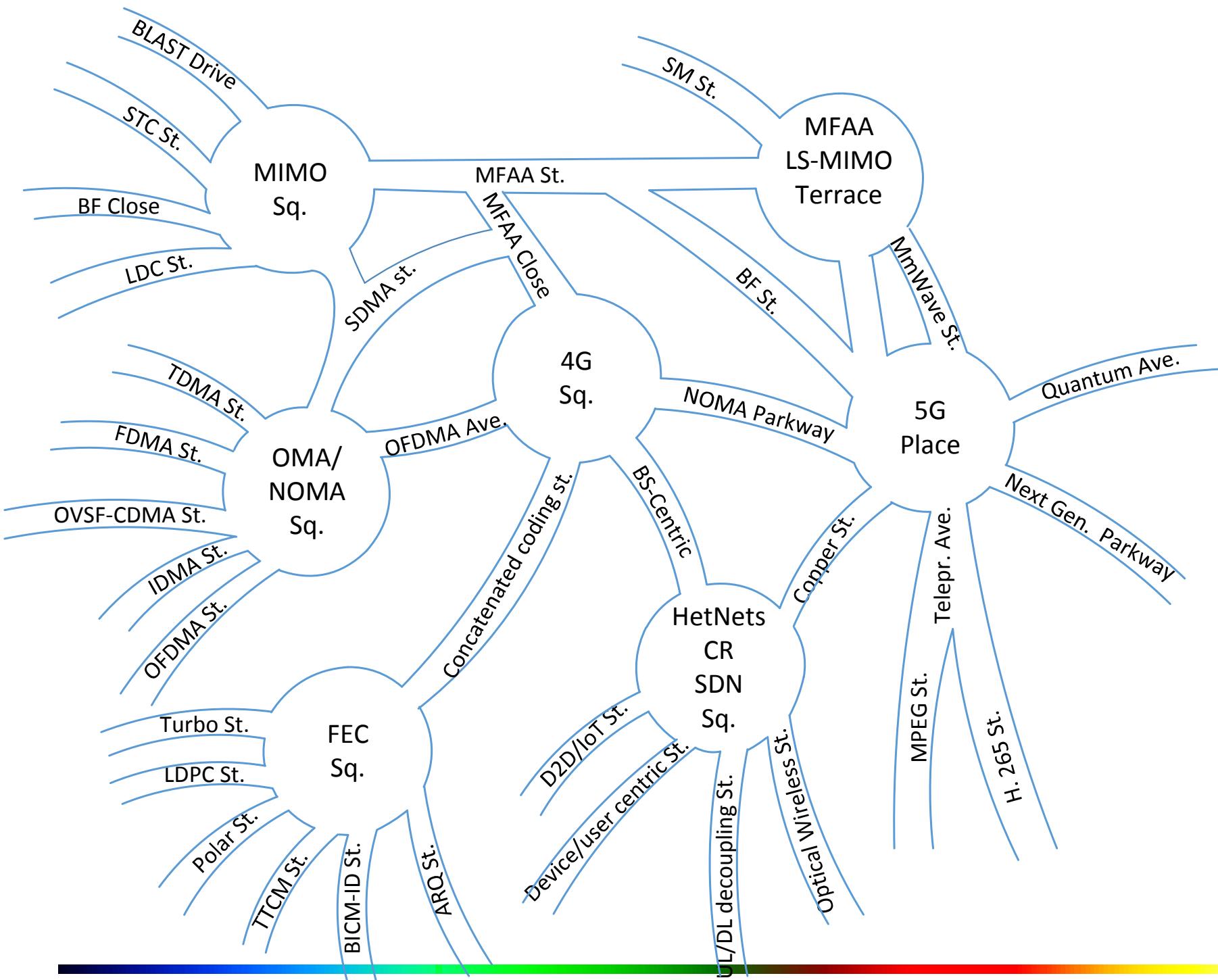
# Intentional DS-CDMA Spreading



# Unintentional Channel-Induced Spreading

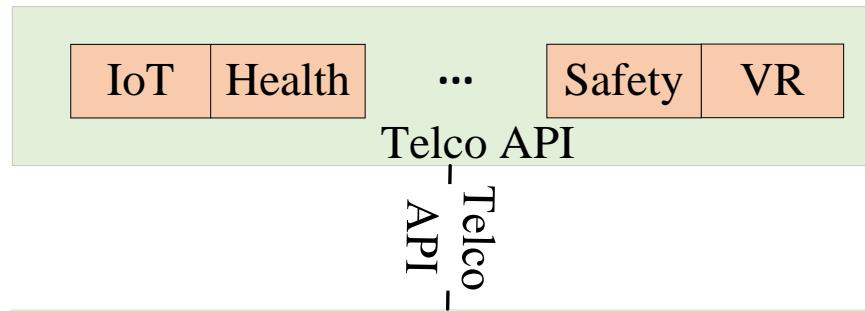


# **Evolution of Multiple Access & its Impact on Wireless Standardization**



# **Next-generation network architecture.**

Applications

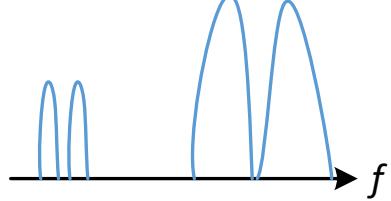


Virtualization

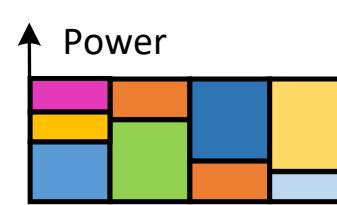
Software defined networking controller

Forwarding

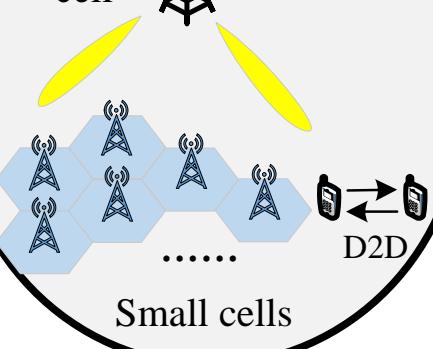
- Ultra Wideband (cmWave, mmWave)



- NOMA



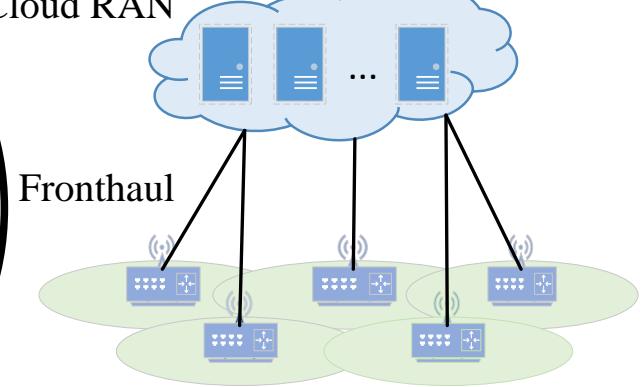
Macro cell  
Massive MIMO



Telco API  
API

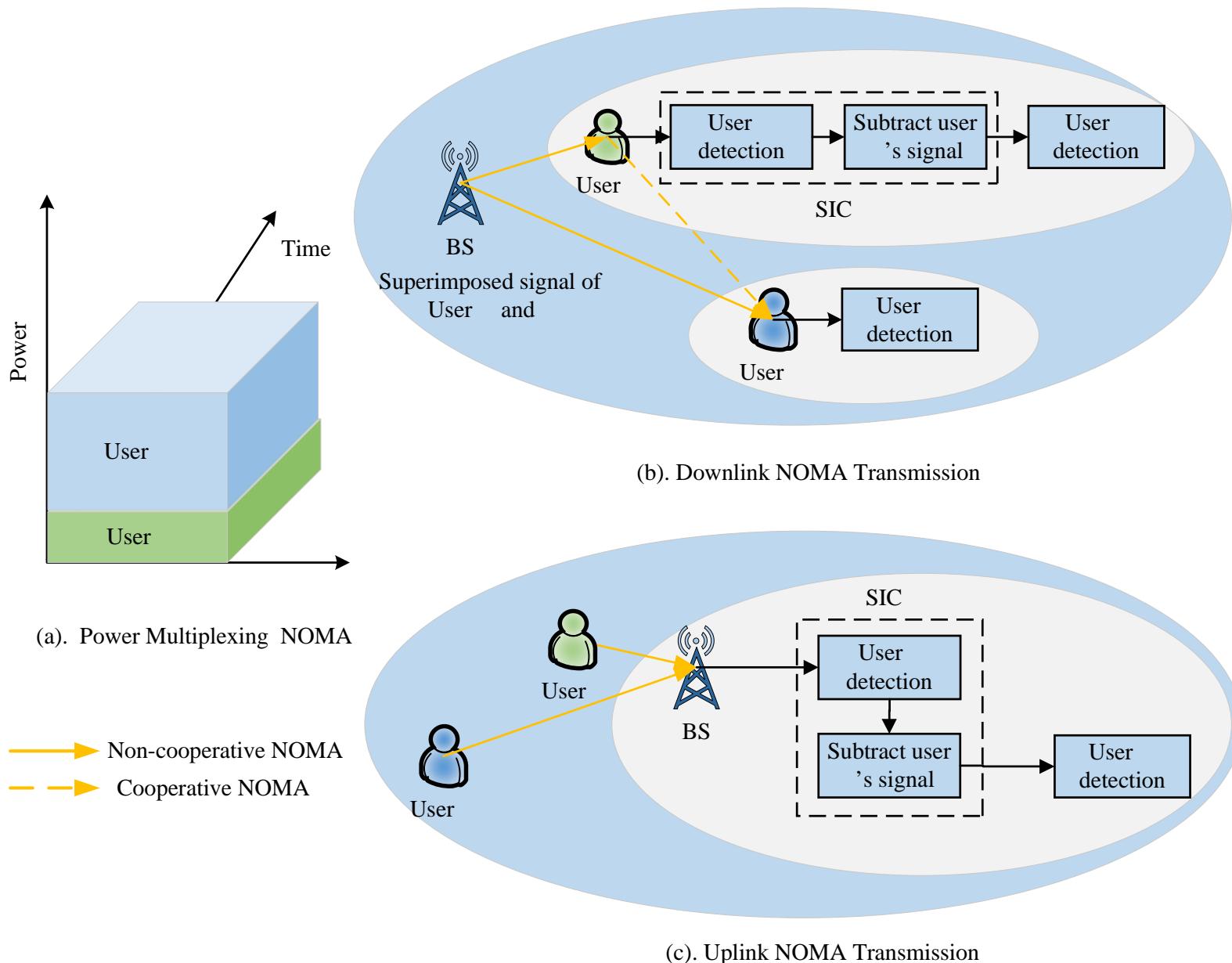
Software defined networking controller

Cloud RAN

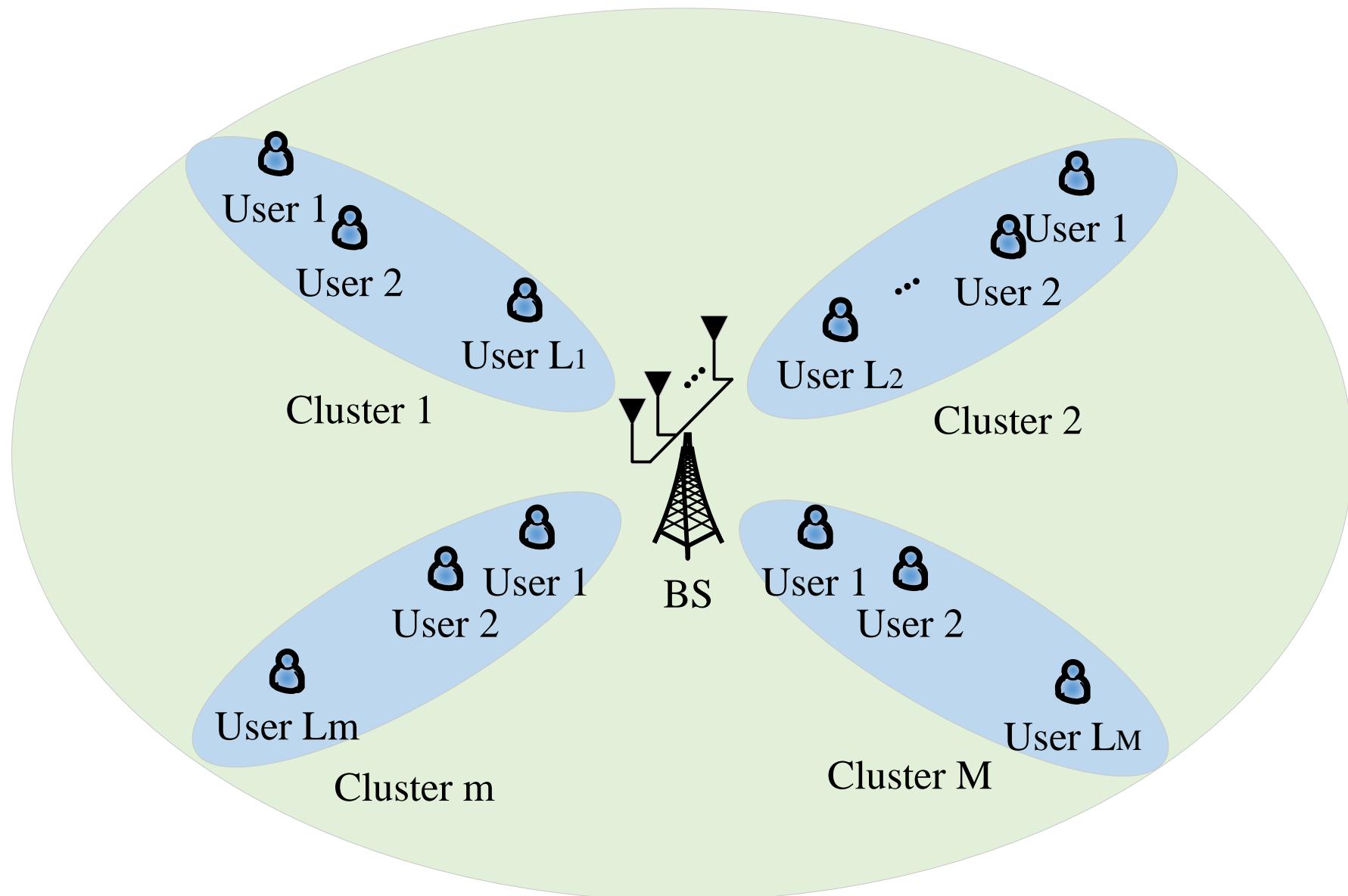


Radio access unit

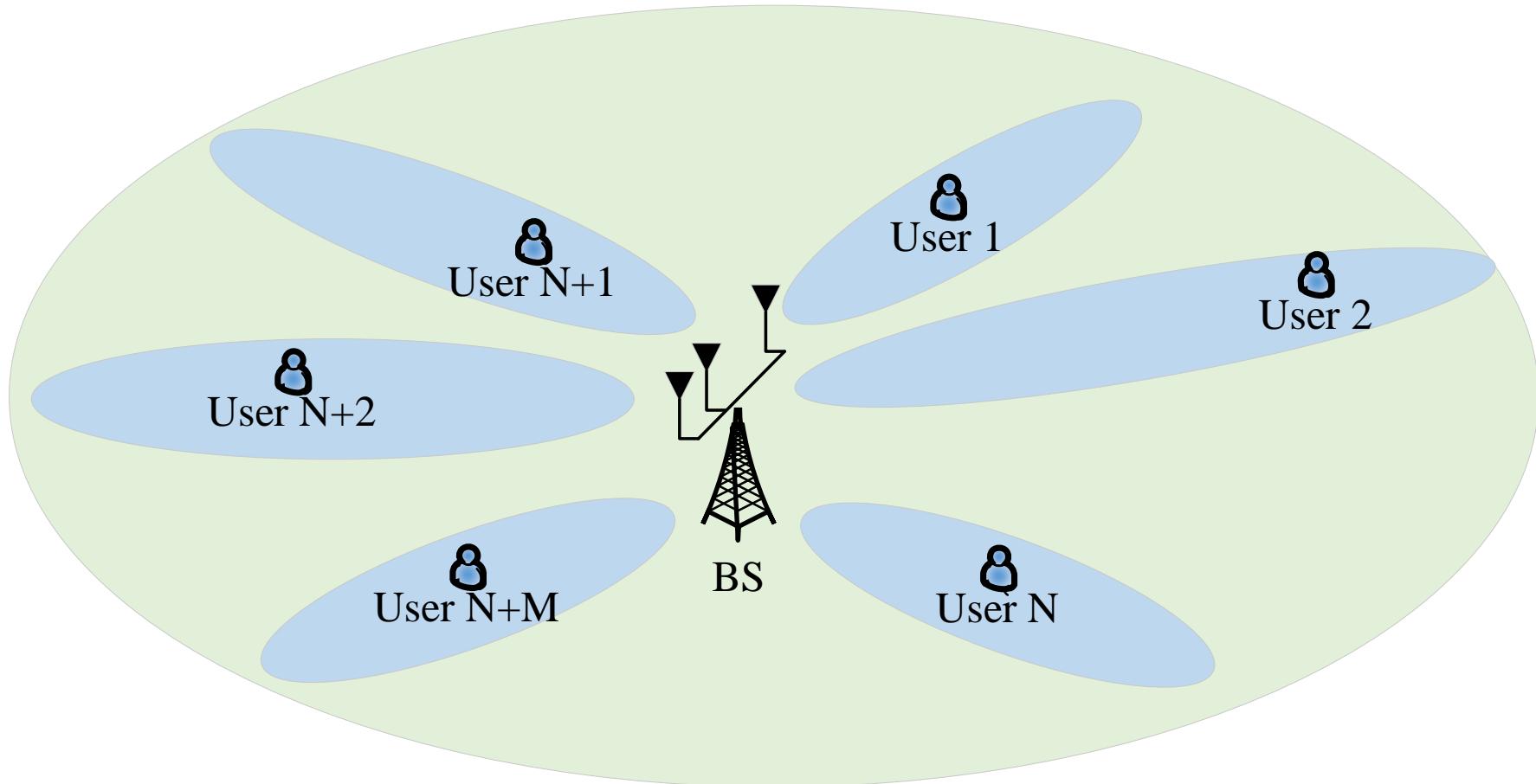
# Power-Domain NOMA



# Cluster-based MIMO-NOMA.



# Beamformer-based MIMO-NOMA.



# NOMA and massive MIMO based hybrid HetNets.

