

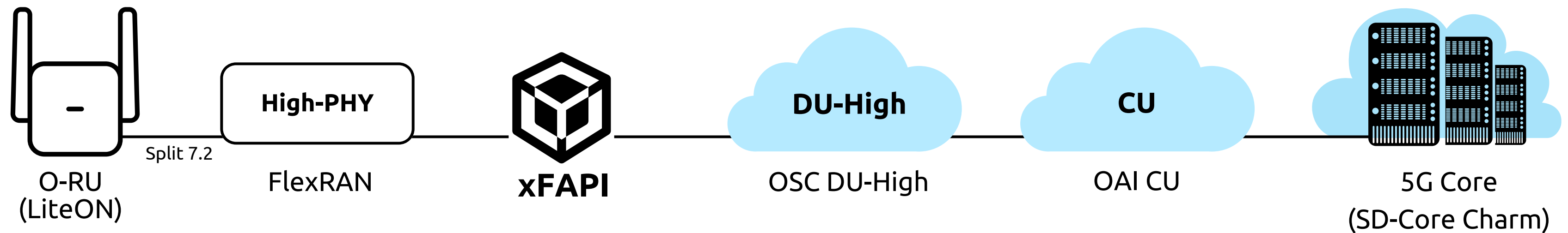
# **xFAPI Enhancements Proposal**

# Problem Statement

- O-RAN is centered around the principles of modularity and open interfaces, yet the MAC-PHY interface, specifically FAPI, remains closed or not connected
- L1 vendors design their software in a way that makes L2-L3 vendors (who adhere to 3GPP standards) either modify their code to align with the L1 or use an additional component to facilitate the connection
- Altering the L2 code to match L1 specifications compromises its 3GPP compliance
- Consequently, most vendors opt to use an intermediary component to maintain an E2E connection while preserving their compliance status
- Each L1 vendor suggests a unique intermediary component & shared lib for interfacing with the L2-L3 layer which leads to vendor lock-in
- This variety made L2-L3 vendors, who aim to demonstrate interoperability with different L1s, manage multiple intermediary components and shared lib support, one for each L1

# E2E Connection with xFAPI

- Successfully connected OS DU-High and FlexRAN v22.11 & v23.07 using xFAPI
- Tested topology:
  - 5G Core + modified OAI CU + modified OSC DU-High + xFAPI + FlexRAN v22.11/v23.07 + LiteON



- Working on modification of xFAPI to fulfill the role of nFAPI within OSC

# xFAPI

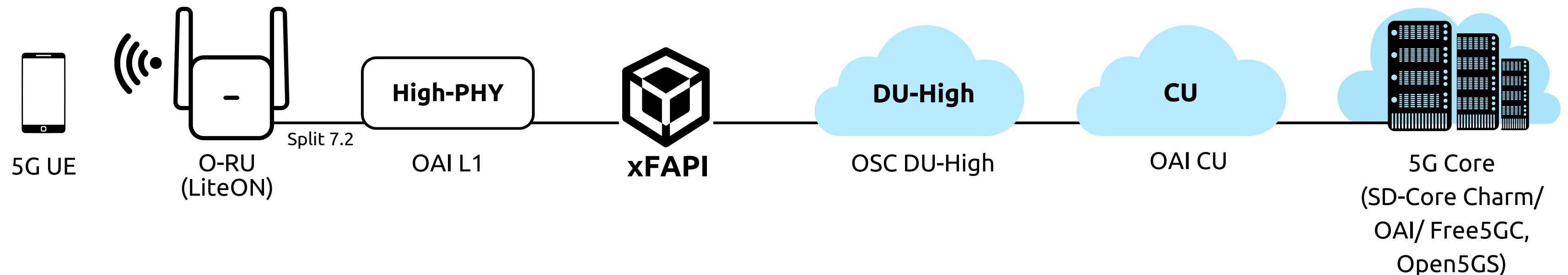
- An intermediate component to establish the connections b/w any L1 and L2 Layers
- Currently, it is able to establish the connection b/w OSC DU-High and different versions of FlexRAN and includes integrated support for shared memory (**xSM**) use across all three entities
- It will be capable of establishing a networking layer that forms a packet-switched IP network to facilitate communication b/w VNF and PNF, performing the role of nFAPI
- It will adhere to SCF222 and SCF225 standards
- For this proposal, we will use xFAPI to establish the connection b/w OSC DU-High and OAI L1
- Plans are underway to extend its capabilities to other L1 vendors, such as NVIDIA Aerial, to enable connectivity with OSC DU-High via xFAPI

# Planning: Interoperable xFAPI

- To address the challenge of maintaining multiple intermediate components, we developed a new component, **xFAPI** which will serve as a universal connector, bridging the gap b/w every L2 and L1, simplifying the integration process, and enhancing overall interoperability
- The purpose of **xFAPI** is to enhance the interoperability of OSC DU High, not just with FlexRAN, but also extend to include OAI and other vendors (e.g. NVIDIA Aerial)
- Rather than using different intermediate components for each L1, we will use a single common connector, xFAPI, for every connection between L2 and L1

# Proposal Topology

- E2E 5G Connection
- Topology:
  - **5G Core:** SD-Core Charm/ OAI/ Free5GC/ Open5GS (Any Open Source 5G Core)
  - **O-CU:** OAI L3
  - **O-DU High:** OSC L2
  - **New Component: xFAPI**
  - **O-DU Low:** OAI L1
  - **O-RU:** LiteON
  - **5G UE:** COTS UE



# CURRENT LANDSCAPE

- OAI adheres to the SCF222.10.02 standards, which are also utilized in the development of xFAPI
- All required 3GPP-based F1AP Procedures have been implemented between OSC DU-High and OAI CU
- OAI L1 is compatible with various 3rd party O-RUs including LiteON, which is being used in this proposal
- Successfully established E2E connections using OAI RAN Stack (CU-DU) with different 3rd Party O-RUs such as LiteON, Benetel, Accton
- Additionally, we have successfully tested the compatibility of the OAI RAN Stack with various open-source 5G Cores, including SD-Core, Open5GS, Free5GC, and OAI