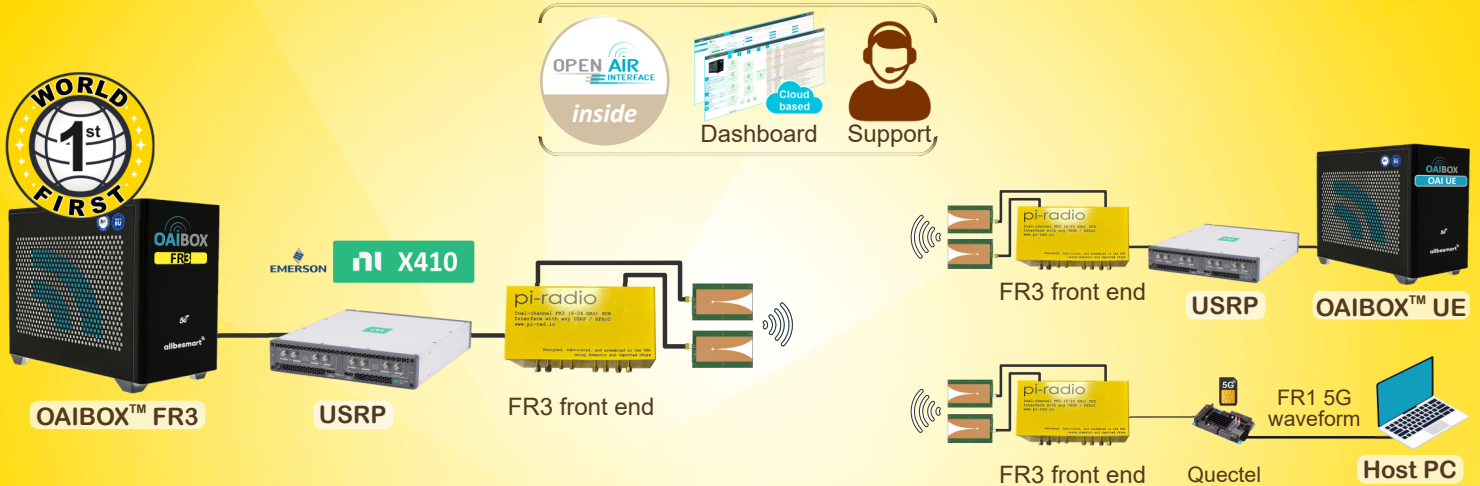




# OAIBOX™ FR3 - THE WORLD'S FIRST

## Frequency Range 3 Open Source Research Platform

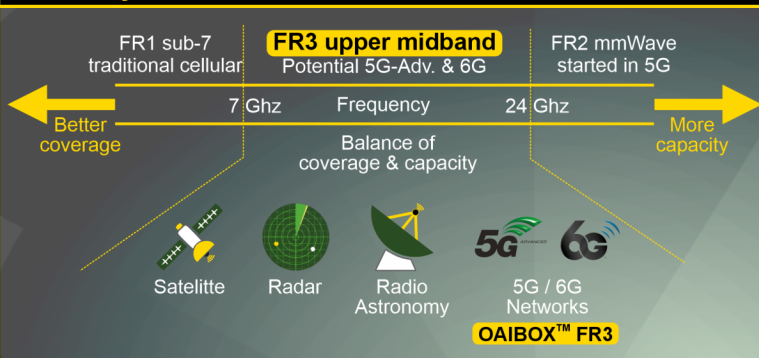


### Open Source platform for end-to-end FR3 research and development

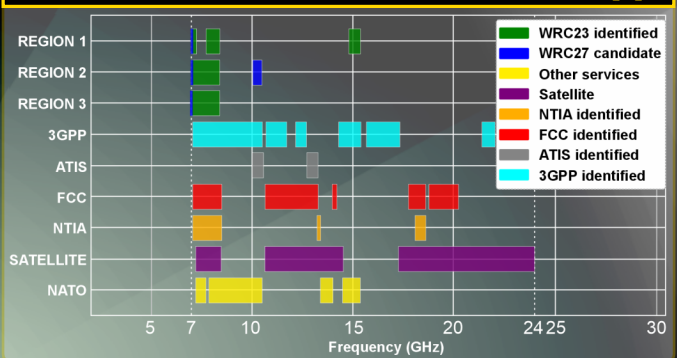
The OAIBOX™ FR3 is an end-to-end open source research platform powered by the OpenAirInterface™ (OAI) stack and designed for comprehensive experimentation of 5G NR over FR3 band. The OAIBOX™ FR3 enables researchers and developers to accelerate innovation in 6G, shaping future standards and regulatory frameworks.

- Includes OAI's CN5G, gNB (CU/DU), Near-Real-Time RIC, and a user-friendly, cloud-based dashboard for real-time network monitoring and control.
- Designed for FR3 radio channel modelling, interference analysis and dynamic spectrum sharing powered by AI/ML.
- Supports configuration of the FR3 carrier, signal bandwidth and fast frequency hopping capabilities.
- The open source OAIBOX™ UE allows researchers to modify the 5G UE protocol stack to test FR3 configurations, beyond current 3GPP 5G NR specifications.
- Allows experimentation of 5G NR waveforms over FR3 carriers with COTS FR1 UEs.
- Customizable for 6G use cases such as Integrated Sensing and Communications (ISAC) and Reconfigurable Intelligent Surfaces (RIS) within the FR3 band.

### Cellular systems coexistence with incumbents in FR3 bands



### FR3 bands of interest: ITU, NTIA, FCC & ATIS [1]



[1] doi: 10.36227/techrxiv.171710345.58907668/v1

### FR3: The "Golden Band" for 6G

FR3 band (7.125–24.25 GHz) is emerging as the "golden band" for 6G, offering an optimal balance between coverage and high capacity. Regulatory bodies, including the ITU, are exploring FR3 for cellular communications alongside current incumbents such as satellite communications and fixed wireless access (FWA). At the World Radiocommunication Conference (WRC) 2023, discussions began about allocating the 7.125–8.400 GHz and 14.8–15.35 GHz bands for International Mobile Telecommunications (IMT), with final decisions expected at WRC-27. From a standardization perspective, 5G NR currently supports FR1 (410–7,125 MHz) and FR2 (24.25–52.6 GHz). However, 3GPP has started exploring parameter tuning for FR3. Experimental research in FR3 requires advanced testbeds for channel model characterization, dynamic spectrum sharing validation, coexistence studies, end-to-end interference analysis, and hardware compatibility testing. **The OAIBOX™ FR3 provides a comprehensive hardware and software platform tailored for experimentation and development in this promising spectrum region.**



### OAI BOX™ Dashboard - Powerful web-based GUI for network management (5G Core & gNB)

The dashboard provides a comprehensive view of the 5G network. Key sections include:

- Network Status:** Shows 1 gNBs and 1 UE. Download speed is 3.5 kbps and upload speed is 15.4 kbps.
- Network Overview:** A network diagram showing connections between N1-N6, N11, and N12 interfaces, including components like IMS, Open Speed Test, AUSF, SMF, AMF, NG-RAN, and O-RU.
- 5G Standalone Message Flow:** A table of network messages such as HTTP2/JSON/NGAP, NGAP, and SACK, with their respective times and details.
- xApps:** A table monitoring various applications like OAI BOX Monitoring, GTP Monitoring, and Slice Monitoring, showing metrics like RNTI, MCS, and SNR.

### OAI BOX™ FR3 Specs



<b>gNB</b>	3GPP 5G NR Release 17
<b>5G CN</b>	OAI 5GCN open source (AMF, AUSF, NRF, SMF, UDM, UDR, UPF, NSSF)
<b>O-DU</b>	OAI BOX™ O-DU
<b>O-CU</b>	OAI BOX™ O-CU
<b>Midhaul</b>	3GPP F1 / Split 2 between OAI O-CU and OAI O-DU
<b>Fronthaul</b>	O-RAN Split 8
<b>USRPs</b>	Integrates with external NI USRPs: NI USRP B200 / B205mini / B210 / N300 / N310 / N320 / X310 (UBX160) / X410
<b>UE</b>	OAI UE   Quectel RM500Q (5G NR waveform over FR3 carrier)
<b>Bandwidth</b>	Up to 100 MHz
<b>Simultaneous connections</b>	32 per cell
<b>Max DL speed:</b>	100 Mbps
<b>Max UL speed:</b>	50 Mbps
<b>End to end latency</b>	< 15 ms
<b>Near Real-Time RIC</b>	Open-source OAI FlexRIC SDK with examples of xApps
<b>Network slicing</b>	Configuration through a xApp, URLLC, eMBB

### pi-radio FR3 SDR Specs



<b>Frequency of operation</b>	6 to 22.6 GHz
<b>Architecture</b>	2-channel MIMO. Simultaneous Tx/Rx
<b>Modular design</b>	Multiple units can be tiled phase-coherently
<b>IF Frequency of operation</b>	1 to 6 GHz center frequency
<b>Instantaneous bandwidth</b>	1 GHz
<b>Mechanical / Thermal</b>	Metallic case including 4 cooling fans
<b>Tx max power per channel</b>	17 dBm
<b>Rx noise figure</b>	3 dB
<b>Control</b>	MicroZed (standalone/ethernet) and direct GPIO
<b>Antennas</b>	Vivaldi (6-24 GHz bandwidth). The system has RF+ control interfaces for new antennas (beamforming arrays)
<b>Programmable gain (Tx/Rx)</b>	53 dB of independently programmable gain, per channel
<b>Onboard clock stability</b>	0.5 parts per billion. Ultra-high stability
<b>Tx-side LO suppression</b>	Yes
<b>LO phase noise</b>	236 dBc/Hz FoM and 134 dBc/Hz normalized 1/f noise

### Some of the clients that trust the OAI BOX™ 5G/6G test solution

Contact us for a live demo @ [www.oaibox.com](http://www.oaibox.com)

Real-time monitoring & control