Airborne & Small Form Factor 5G NR gNB

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Leveraging OAI for Airborne Link Measurements

• Research focus areas
  – Adapt airborne network positions rapidly to maintain channel conditions
  – NR BandWidth Part (BWP)
  – Integrated Access / Backhaul

• Airborne radio challenges
  – Size, weight, and power
  – RF characteristics for 5G RAN
  – Support for OAI
Epiq Solutions’ Sidekiq NV100 Software Defined Radio

• RF Specifications:
  – Dual channel: 2 RX, 2TX, or 1TX/1RX (FDD/TDD)
  – 40 MHz bandwidth per channel
  – 30 MHz to 6 GHz
• Integrated GPS clock
• FPGA: Xilinx Artix-7 XC7A50T
• Form factor: M.2 (22mm x 80mm x 4.5mm)
• Weight: 9.07 grams
• Power consumption: 4-6 Watts
## Comparing NV100 to Commonly Used SDRs

<table>
<thead>
<tr>
<th></th>
<th>Sidekiq NV100</th>
<th>USRP B210</th>
<th>USRP B205mini</th>
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</thead>
<tbody>
<tr>
<td><strong>RFIC</strong></td>
<td>ADRV9004</td>
<td>AD9361</td>
<td>AD9364</td>
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<tr>
<td><strong>Instantaneous Bandwidth</strong></td>
<td>40 MHz</td>
<td>56 MHz</td>
<td>56 MHz</td>
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<td>(per channel)</td>
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<tr>
<td><strong>Max Sample Rate</strong></td>
<td>61.44 MS/s</td>
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<tr>
<td><strong>ADC/DAC Precision</strong></td>
<td>16-bit A/D 16-bit D/A</td>
<td>12-bit A/D 12-bit D/A</td>
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</tr>
<tr>
<td><strong>Frequency Range</strong></td>
<td>30 MHz – 6 GHz</td>
<td>70 MHz – 6 GHz</td>
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</table>
Standalone 5G Small Form Factor Demo

- Small form factor 5G system
  - Fraunhofer 5G Core
  - OpenAirInterface gNB
  - Sidekiq NV100 SDR
- Single UE
  - Quectel RM500Q-GL

Host computer specs
- Intel NUC11PAHi7
  - CPU: Intel i7-1165G7
    - 3.30 GHz, turbo up to 4.9 GHz
    - 4 cores, 8 threads
- OAI source code: 2022.wk42b
- Native OAI LDPC decoding (using CPU)