Towards an All-Digital Antenna Array Transmitter
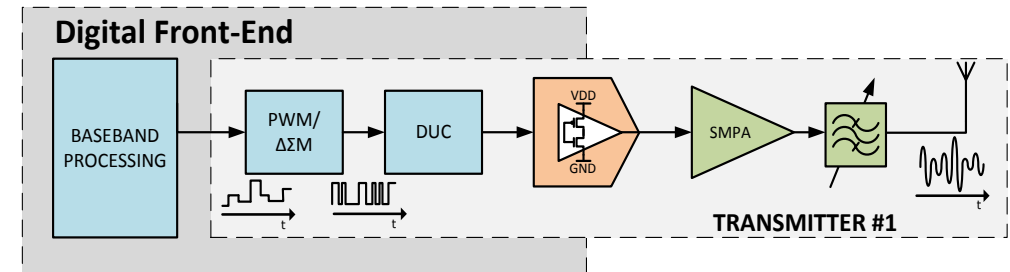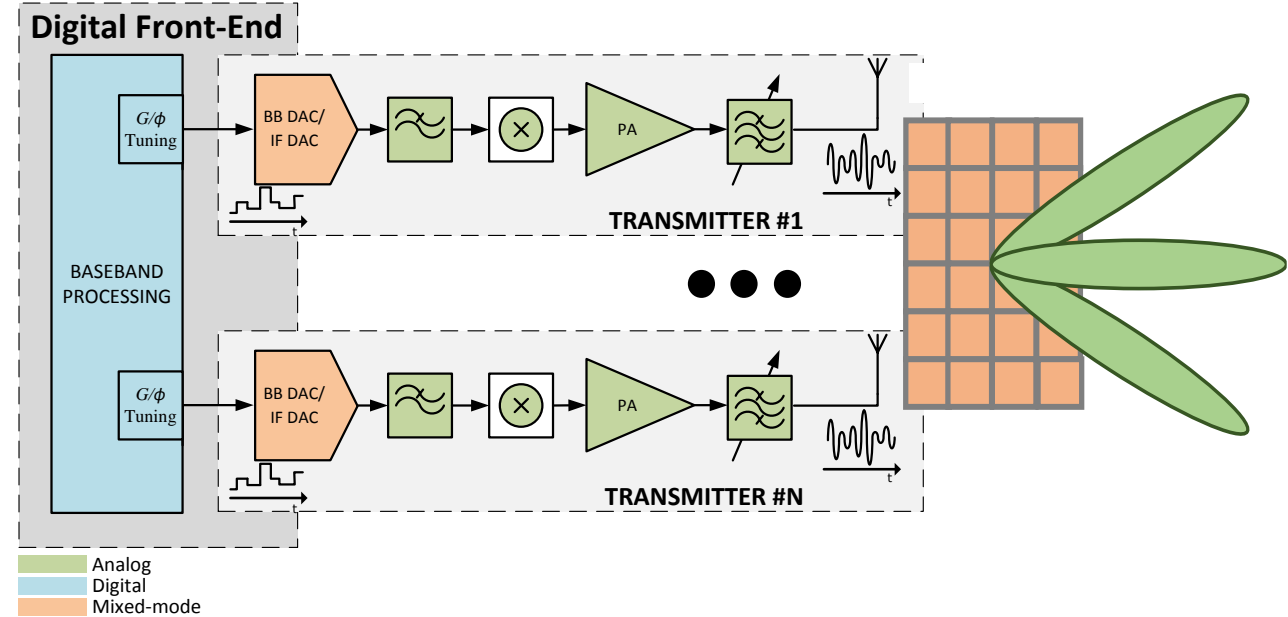
Antenna Arrays:

- Target Flexibility, Reconfigurability and Spatial Agility;
- Essential for Personal, Commercial and Military applications;
- Beamforming Networks are required to distribute power, scaling the amplitude and shifting the phase of each output.

Antenna Array Challenges:

- Complexity
- Thermal Control/Monitoring;
- Weight
- Power

All-Digital Transmitters

- Fully digital transmitters with a digital radio datapath from the baseband up to the RF stage;
- External and commercial n-bit DACs are replaced by flexible, reconfigurable and on-chip 1-bit versions (typically and MGT);
- Analog front-end is summed to just Amplification, Filtering and Radiation!

INSTITUIÇÕES ASSOCIADAS:

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Towards an All-Digital Antenna Array Transmitter

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|PhD Forum, 26 th FPL | Lausanne, Switzerland, 31st August 2016 | Slide 1 |

Towards an All-Digital Antenna Array Transmitter

Our Proposal: **All-Digital Antenna Array Transmitter**

Explore reconfigurable all-digital transmitters (ADTs) implemented into a single FPGA to design antenna array systems with a massive number of elements.
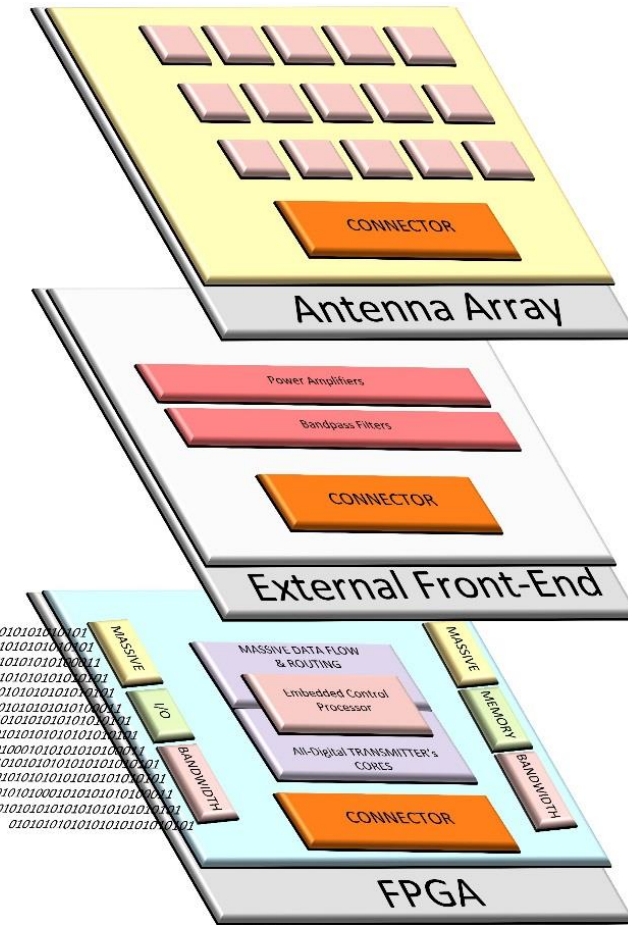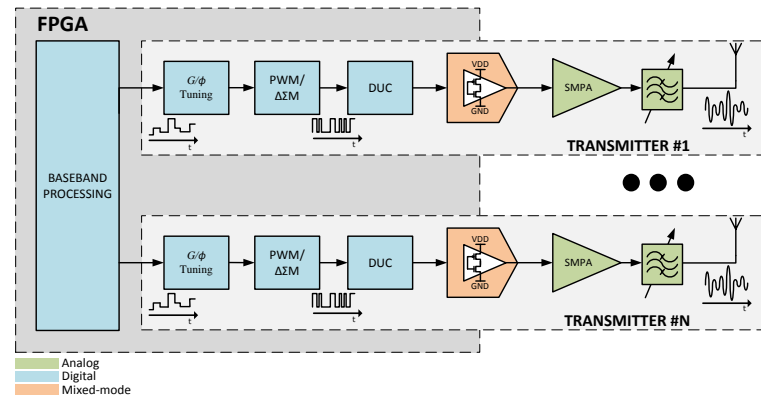
Key features:

- Without external DACs and external upconversion stages;
- Reduction of BFN's complexity, enabling a layout simplification;
- All the system implemented with a minimal external front-end (just Amplification, Filtering and Radiation);
- Digital Beamforming Techniques implemented in a straightforward way;
- Software Application layer conferring a new level of reconfigurability and flexibility

New block "G/ϕ Tuning" must be included into the ADT architecture:

- Responsible for performing the amplitude and phase scaling of each output in baseband;
- Core in the design of digital beamforming techniques.

The same block can also be used to estimate the phase deviation between all the MGTs (calibration phase)!

WANT TO KNOW MORE?
VISIT ME IN THE PhD FORUM!

Towards an All-Digital Antenna Array Transmitter