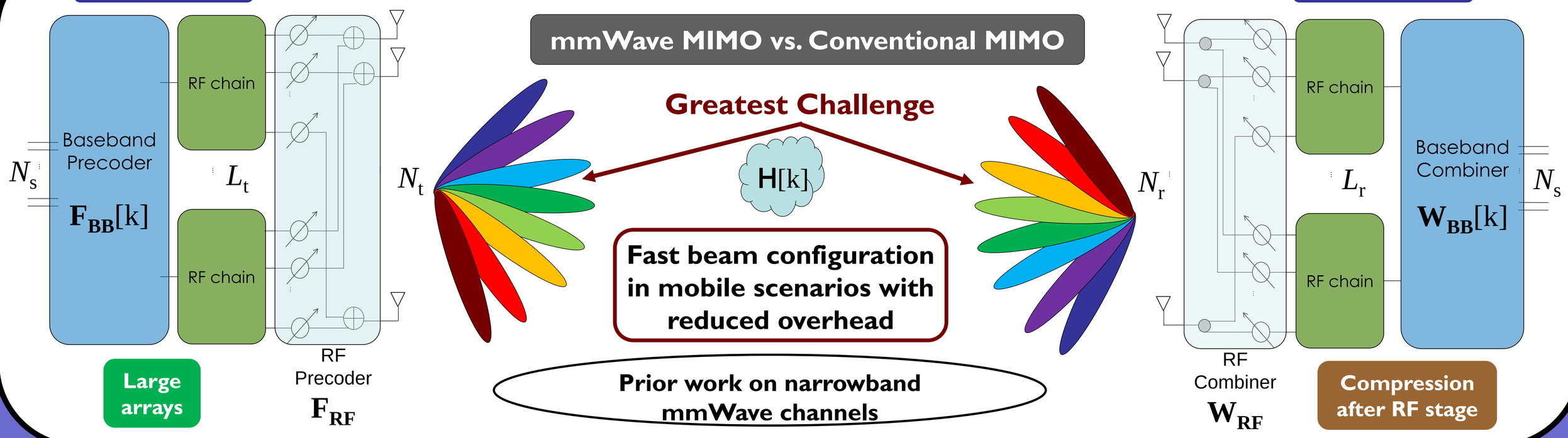
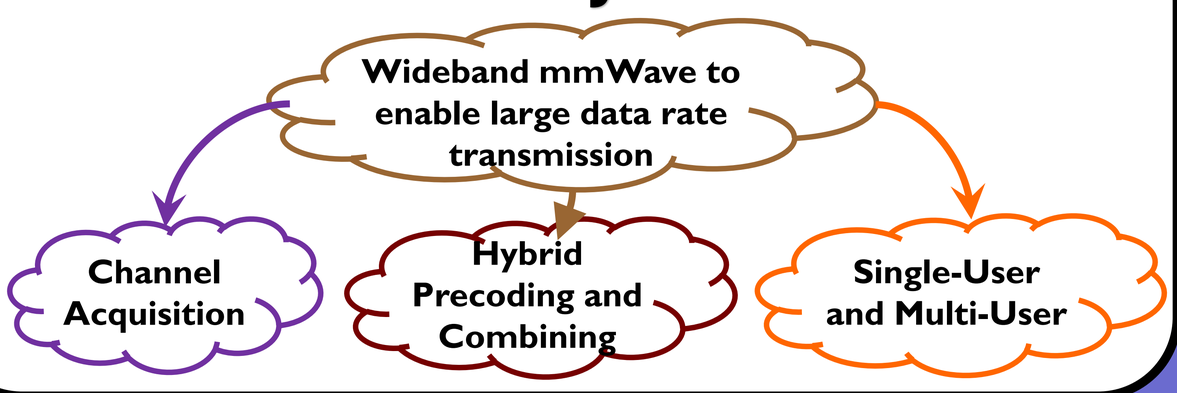
SPARSE SIGNAL PROCESSING FOR MILLIMETER-WAVE COMMUNICATIONS

Javier Rodríguez-Fernández and Nuria González-Prelcic
{jrodriguez,nuria}@gts.uvigo.es

MOTIVATION OF THE WORK



THESIS OBJECTIVES



RESEARCH PLAN

Tools for mmWave MIMO Signal Processing

Statistical Signal Processing for Compressive Estimation

Advanced MIMO processing

Tools for Sparse Recovery and Optimization

Study of the state-of-the-art → **Design and Analysis of SP Techniques** → **Critical Thinking and Interpretation**

PERFORMANCE INDICATORS

Asilomar 2016 [1]

ICC 2017 [2]

Globecom 2017 [3,5]

Transactions on Wireless Comms. [4,6]

Other Activities

- Stay in Huawei (April 2017)
- Attendance at ICC 2017 (May 2017)
- Presentation of a conference paper in ICC
- Attendance SPS 5G with a Huawei grant (June 2017)
- Technical poster presentation in SPS 5G [7]

NEXT YEAR PLANNING

First Semester 2017-2018

- Spatial Covariance Estimation
- Channel Acquisition Approaches
- Hybrid Precoding/Combining

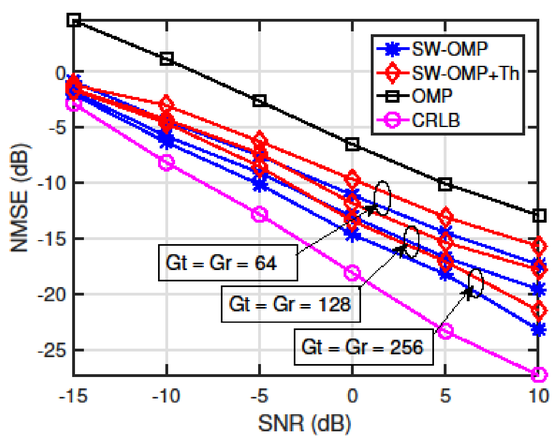
Second Semester 2017-2018

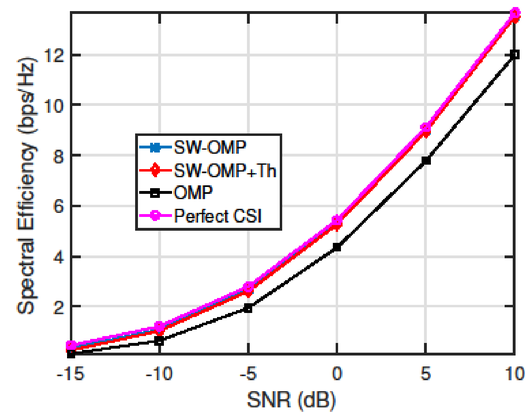
- Conference Paper
- Preparation Communication
- Long Research Stay

RESULTS AND DISCUSSIONS

Two new algorithms for wideband channel estimation: SW-OMP and SS-SW-OMP+Th

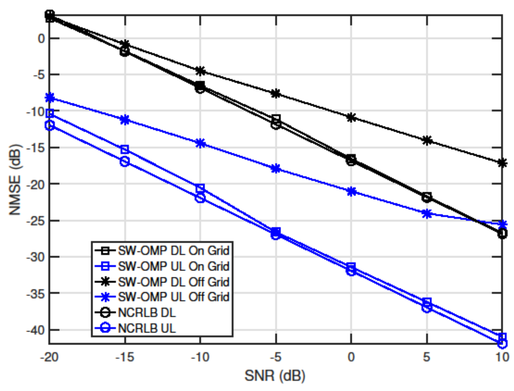
Estimation performance for single-user [1-4]

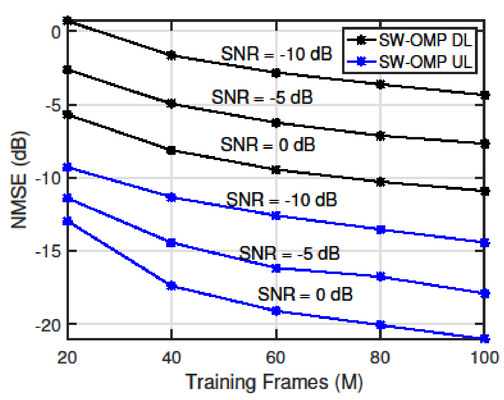




Near-optimal data rates | **Asymptotic Efficiency** | **Low overhead and complexity**

Estimation performance for multi-user [5-6]





Uplink vs Downlink channel estimation

Hybrid MMSE-SVD solution for prec./comb.

REFERENCES

[1] J. Rodríguez-Fernández, N. González-Prelcic and R.W. Heath Jr., "Channel estimation in mixed hybrid-low resolution MIMO architectures for mmWave communication", Asilomar 2016
[2] J. Rodríguez-Fernández, K. Venugopal, N. González-Prelcic and R.W. Heath Jr., "A frequency-domain to wideband channel estimation in millimeter wave systems", ICC 2017, Paris (France)
[3] J. Rodríguez-Fernández, N. González-Prelcic, K. Venugopal and R.W. Heath Jr., "Exploiting common sparsity for frequency-domain wideband channel estimation at mmWave", submitted to Globecom 2017.
[4] J. Rodríguez-Fernández, N. González-Prelcic, K. Venugopal and R.W. Heath Jr., "Frequency-domain Compressive Channel Estimation for Frequency-Selective Hybrid mmWave MIMO Systems", submitted to IEEE Transactions on Wireless Communications, available at arXiv, 2016.
[5] J. P. González-Coma, J. Rodríguez-Fernández, N. González-Prelcic and L. Castedo, "Channel estimation and hybrid precoding/combining for frequency selective multiuser mmWave channels", submitted to Globecom 2017.
[6] J. P. González-Coma, J. Rodríguez-Fernández, N. González-Prelcic, L. Castedo and R.W. Heath Jr., "Uplink versus downlink wideband channel estimation and hybrid precoding and combining for frequency selective multiuser mmWave MIMO systems", under preparation.
[7] J. Rodríguez-Fernández, N. González-Prelcic and R.W. Heath Jr., "Exploiting common sparsity for frequency-domain wideband channel estimation at mmWave", IEEE Joint EURASIP and Summer School on 5G Wireless Access, June 2017, Gothenburg (Sweden).