1 5G Vision [1, 2, 3]

5G summarizes the challenges ahead for future wireless networks: higher data rates; lower latencies; higher network densities; wireless for mission-critical services. These challenges create a heterogeneous picture for future wireless. A number of new technologies are being considered to face these challenges.

2 Massive MIMO

A selection of important papers on Massive-MIMO can be found on a website hosted by the IEEE Communications Society:

http://www.comsoc.org/best-readings/massive-mimo

Foundations [4, 5, 6]

Massive MIMO considers—at one side of the wireless link—a smart antenna (array antenna with complete signal processing chains behind each antenna element) with “very many” elements, e.g. > 100. The resulting wireless link is capable of removing multipath fading and capable of supporting multiple spatial streams simultaneously.

System Architecture [see http://www.comsoc.org/best-readings/massive-mimo]

How many antennas are actually needed? What is the advantage of TDD operation?

Analysis of Energy and Spectral Efficiencies [see http://www.comsoc.org/best-readings/massive-mimo]

The analysis of capacity bounds for massive MIMO system demonstrates the potential gain.

Channel Estimation [see http://www.comsoc.org/best-readings/massive-mimo]

A fundamental problem of massive MIMO ist the estimation of a massive number of wireless channel gains.
3 mm-Wave Systems

Hybrid Analog and Digital Beamforming [7, 8, 9]
Directional antennas are needed in mm-wave systems (carrier frequency $\geq 28$ GHz) to overcome the high path loss. Hybrid analog/digital beamformers allow for many antenna elements while keeping the complexity limited.

mm-Wave Radio Channels [10, 11, 12]
Modeling of the radio propagation characteristics is a pre-requisite for using new frequency bands for wireless networks.

4 Waveform Design [13]
New waveforms are proposed to overcome the challenges posed by 5G systems.

5 Location Awareness

Location Awareness [14]
Location information can support various performance indicators of a wireless network.

MINT—Multipath-Assisted Indoor Navigation and Tracking [15, 16, 17]
The TU Graz approach: location-awareness for robust positioning – exploiting multipath propagation

Localization and Location-Awareness in Ultra-Dense Networks [18, 19, 20]
Ultra-dense networks are part of the envisioned evolution to become a reality in 5G networks. These works discuss the potential for 3D localization and location-aware communications arising thereof.

References


