

From Wireless to Broadcasting to Wireless, 1919-2019

Open Session Proposal, SHOT Conference Milan 24-27 October 2019

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Wireless radio was one of many topics at the 1919 Paris Peace Conferences. The Paris radio discussions propelled a transformation that eventually set aside previous *ad hoc* approaches to bandwidths and frequencies. Users, corporations, and nations would no longer send signals through an uncharted global radio spectrum. By 1927, the transformations begun in 1919 brought about radio spectrum management: a global system of governance that denoted certain sections – bandwidths – of the spectrum for specific applications, such as safety-of-life-at-sea, aviation, navigation, and geodetics. And, of course, global spectrum management created space for what had become one of the most popular and prevalent uses of radio: broadcasting. Broadcasting and many other activities in the radio spectrum thrived, all protected by their own dedicated frequencies. Separation into dedicated frequencies brought order, growth, and a sense of borders to the spectrum, and revenue through patents and intellectual property.

Early in the 21st century, signs emerged suggesting this process needed reconsideration, particularly in recognition that personal mobile communication devices brought new levels of scarcity to the spectrum. Previously, scarcity was ameliorated by the agreed patrolling of frequencies and bandwidth usage, ranging from engineering standards that brought signal precision to enforcement standards by nations and global bodies such as the International Telecommunication Union (ITU). Despite a 20th century of success, the 21st century saw a new condition: the transformational moment to realign allocations and uses of the entire radio spectrum from ELF (extremely low frequency) to THF (tremendously high frequency) had arrived. This called for charting and utilizing the terahertz frequency range and millimeter-length waves for research, development, assignment, and allocation, the last spectrum territory just before infrared and visible light. After a century, a natural resource once considered inexhaustible (if it could be managed efficiently) was on the verge of saturation. Technologies, devices, and waves would now have to work together. Each and every device now needed the potential to endlessly work across many wavelengths, for that would have to happen to bring about a new world of wireless: wireless for an Internet of Things, for 1,000,000 phased array antennae per square kilometer, for routers, reflectors, and cognitive radio, and for massive MIMO (Multiple Input, Multiple Output.) This world is perpetually saturated with wireless signals from ELF to THF. This is the world of 5G, a world with wireless at the conceptual center of the spectrum, raising questions regarding the past century of distinct and separated services, uses, frequencies, and bandwidths as conceptual cornerstones of radio spectrum governance.

Proposals exploring interfaces between technology, art, and design are invited, as are proposals dealing with issues relevant to specific time periods, locales, endeavors, and policies. The session topic of transformations, transitions, technologies, policies, and uses of the radio spectrum over the past 100 years is broadly construed. A wide range of themes, ideas, and approaches are welcome. Please send one-page proposal, one-page CV, and contact info to j-schwoch@northwestern.edu by 25 March 2019. Thank you!