Below are excerpts from US Patent No. 12477468 B1, entitled "Ad Hoc RF Network Structures and Methods" issued by United States Patent and Trademarks Office (USPTO)

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Note: The United States Patent No. 12477468 B1 is a continuation of the United States Patent 12363640 B1. While sharing common subject matter, the "Claims" sections of the two patents differ.

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ABSTRACT

Structures and integration of circuits and sub-systems for ad-hoc, wide-bandwidth, radio frequency (RF) networking are disclosed. Networks may have both mobile and stationary Users. Disclosed are structures and methods for User network access via time, space, code and frequency domain sharing. A physical layer of network architecture comprises novel encoders, modulators, demodulators and phase-based beamformers. Embodiments may function as integrated systems providing communication capabilities for future networks such as 6th Generation (6G). Enabled operational capabilities may include low-latency, ad-hoc network access. Deployment concepts may include coupling to platform-specific User Equipment, thereby allowing diverse User form-factors and functions. Small, low-power form-factors are made viable by integration of memristor technology into novel structures and circuits.

BACKGROUND OF THE INVENTION

Wireless communication has spanned several generations of systems. These included earlier Time Domain Multiplexed (TDM) and Frequency Domain Multiplexed (FDM) systems. These were followed by more complex multi-access schemes, such as

Code Domain Multiple Access (CDMA) for 3G networks, and Orthogonal Frequency Domain Multiplexing (OFDM) in 4G and 5G networks. The latter systems require sophisticated coordination through a network of base stations. They have successfully serviced the growing markets for personal communications for several years. However the Internet-of-Things (IoT), sophisticated machine-to-machine (M2M) communications, and expanded personal use will require new wireless networks. Although certain emerging 6G techniques (such as mmw carriers) may facilitate future networks, many basic challenges exist. Operational issues will include low-latency, ad hoc connectivity among multiple Users. This may be fundamentally at odds with traditional paradigms of network coordination through a base station or centralized controller. Also, the evolution of RF systems to higher carrier frequencies and wider bandwidths may impose extreme computational requirements with limited space and power resources.

SUMMARY OF THE INVENTION

The present disclosure provides certain illustrations, examples and descriptions. These are not intended to be exhaustive or limiting of embodiments of the invention. Given the present disclosure, it will be apparent to one skilled in the art that variations or modifications of the embodiments described herein may be possible. It is intended that all such variations and modifications fall within the scope of the present invention.

Emerging 6G technologies (such as mmw carriers and high density antenna arrays) may facilitate future wideband networks, but many basic challenges exist. Issues regarding latency and ad hoc network access pose major operational difficulties. Also, the inherent nature of signals creates challenges such as “Doppler Spreading” for mobile Users, and elevated Peak-to-Average Power Ratio (PAPR) in OFDM type signals.

Accordingly, the present invention may integrate circuits and sub-systems to support ad hoc, low-latency, wideband RF networks. Advantageous methods and embodiments of the invention may allow User network access via simultaneous temporal, spatial and code domain sharing. This includes the use of pulse signals for temporal

domain sharing, beamforming for spatial domain sharing, and the embedding of User identification information into pulses for code domain sharing.

Embodiments characterized by integration of novel analog and digital circuits may provide desired operational capabilities for future 6th Generation (6G) networks. This may include low-latency, ad hoc network access. Deployment concepts of the invention includes coupling to platform-specific User equipment, thereby supporting various types of User forms and functions. Some circuits of the invention might be combined onto a single monolithic device or "die" as disclosed. In this way the circuits' physical impact upon a User may be minimized.

Multiple Subsections of the SUMMARY OF THE INVENTION Section are deleted herein. The complete Section and remainder of the Patent document including DETAILED DESCRIPTION may be found at the USPTO website.

Filename: PN1C Excerpts