



ISART Conference Boulder, Co

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Powerwave Cognition, Inc.
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What megatrend are we trying to solve

- IP is a megatrend and it is pushing higher data rates in wireless
 - Part of the success of IP are the open standards and the ease of use and implementation
 - Moore's law continues to drive device capacity and drive silicon costs lower and this in turn increases the capability of IP networks and devices
- Wireless technologies cannot keep up with the IP megatrend unless we:
 - Continue to shrink cell sizes
 - The pathological terminus is when the end user devices themselves are the cells as in mobile ad hoc networks where the devices operate in infrastructure-less mode and peer with each other or with network backhaul
 - Increase the amount of owned and operated spectrum for the incumbent carriers
 - This is a bounded problem and has large spectrum allocation issues associated with it
 - Increase the amount of unlicensed spectrum
 - Today's usage promotes wastage and therefore this may not be a good use of spectrum unless new rules & technologies can be introduced



What tools haven't we tried

- The Spectrum challenges we face are daunting. However, we have not reached the limit of improving the spectrum efficiency capability within the existing cellular networks and unlicensed band networks, two key areas that can be exploited for a very long time to come are
 - Cooperative radio technologies
 - Uses the exchange of information between nodes and/or between nodes and databases to drive maximum spectrum usage in a given spectrum
 - In this context a node can be a BTS or AP or an end-user device
 - Generally based on intelligent software in the router and/or MAC layers of a radio that is designed for co channel cooperation, time and frequency access fairness between competing radios
 - Cognitive radio technologies
 - Unilateral decision making to find underutilized spectrum based on a priori policy data without coordination with other nodes
 - Generally based on physical layer sensing technology
 - Combine both if needed

