

# Orthogonal Beams on Base-Stations for Frequency Reuse

by Dr. Donald Chang

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**Abstract:** Spatial Digital Systems (“SDS”) has developed an innovative technology solution to reduce significantly the constraints on access bandwidth for mobile service providers. The need for more access bandwidth will accelerate as more next generation networks are deployed and the demand for media rich applications increases. SDS does not believe existing technical solutions as well as market based pricing plans to reduce usage will be viable over the long term. SDS’s solution addresses the core issue of improving the efficiency of access bandwidth usage. SDS’s orthogonal beam (“OB”) architecture for base stations enables operators to allocate existing spectrum assets (same frequency bandwidth) 10 to 50 times more efficiently through unique beam forming techniques. SDS’s unique technology provides every subscriber with a designated tracking beam; a beam which will always feature a peak at a desired user direction, and which will null at directions of all the other 9 to 49 users using the same frequency slot. The OB solution enables a subscriber to be kept dynamically on the peak of a designated tracking beam with minimized inter-beam interferences from other subscribers.

**About Speaker:** Biography: Dr. Chang is the CEO for Spatial Digital Systems (SDS) to develop smart antenna technologies that enhancing today’s wireless communications. He retired from Hughes Electronics Company in 2002 as a Chief Technologist after more than twenty years of service. He participated in many commercial and military spacecraft designs, and was responsible for a multitude of advanced communications satellite systems and spacecraft antenna initiatives. His latest focus at Hughes Electronics as the chief architect was on telecommunications for broad-band fixed IP wireless and the 3G mobile communications systems utilizing stratospheric platforms. Dr. Chang holds over 90 U.S. patents with more than 70 additional patents pending on smart antennas, digital/optical beam formers for imaging and communications. He has won multiple awards for his work related to synthesized aperture techniques and digital beam forming. He earned his Ph.D. & MSEE from Stanford University in 1978, completed his MSEE & BSEE at National Cheng-Kung University, Taiwan, in 1972 and 1969, respectively, and did his post-MS studies at Johns Hopkins University in 1973. He also graduated from Strategic Leadership Institution, Anderson School, UCLA in the summer of 2000.

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