

Wideband Full-Duplex Fading Channel Emulator

An accurate realization of wireless radio propagation channels for two wireless devices

Key Features

- Full-duplex fading channel emulation of two nodes
- Wideband: 100 MHz Bandwidth
- Operational frequency range: 50 to 2500 MHz
- Input signal level: -50dBm to 20dBm
- Doppler frequency: 0 to 2000Hz in 0.01Hz steps
- Supports Ricean small-scale fading and exponential path loss large-scale fading
- Can be configured for isotropic and non-isotropic scattering
- Optional support for accurate ray-tracing models

Functional Description

Ukalta's UEMU-1x1 fading channel emulator is the first full-duplex simulator with a wide bandwidth of 100 MHz that simulates various indoor radio channels over a wide range of frequencies (50 MHz to 2.5GHz), independent of the wireless standards that devices operate under. Two devices under tests (DUTs), each with a single antenna, are connected via programmable radio frequency (RF) interfaces to a compact and accurate fading channel emulator. In order to eliminate the RF interference from other devices in an open-air laboratory setting, the DUTs are fully shielded.

Site-specific information of an indoor environment can be used to configure the fully-parameterizable fading channel emulator through controller software with a graphical user interface (GUI) running on a workstation. In addition, the UEMU-1x1 can be parameterized using the on-board keypad and LCD screen. Due to the relatively small Doppler shifts, low data transmission rate, short range of communication, and absence of large delay spreads encountered in typical indoor environments, the small-scale behaviour fading is described by Ricean fading. The fading channel simulator also supports large-scale fading and shadowing. UEMU-1x1 can be upgraded to support higher frequency ranges above 2.5 GHz and additional small-scale and large-scale fading models.

Feasibility

UEMU-1x1 provides system designers with repeatable emulation of wireless conditions, which reduces time-to-market. To maintain a cost-effective testing solution, UEMU-1x1 can be easily scaled to support a variable number of wireless devices. Moreover, consistent test outcomes can be obtained as the DUTs are isolated from external RF interference.

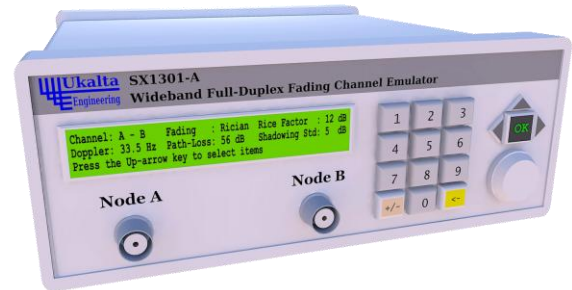


Figure 1: Ukalta's wideband, full-duplex fading channel emulator

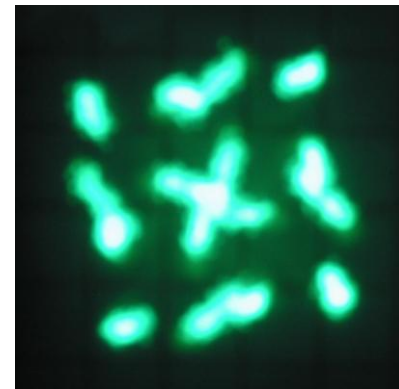


Figure 2: Effect of fading on transmitted symbols on an oscilloscope

Applications

- Testing and verification of wireless transceivers
- Performance measurement under realistic channel conditions
- Performance evaluation of modulation and media access techniques
- Transceiver QoS and sensitivity testing
- Signaling, power control, and media access protocol design
- Link and network layer protocol design
- Research and development
- Testing of wideband FSK transceivers
- Testing Bluetooth and Zigbee modules
- Testing general frequency-hopping and spread-spectrum systems
- WiFi, WiMax, GSM, WCDMA and CDMA2000 testing

Related Products

Ukalta's wideband and full-duplex fading channel emulator also supports other statistical channel models such as Rayleigh, Nakagami and Weibull to reproduce accurate channel characteristics. Ukalta's flexible tester can be configured for user-defined fading spectrums, and different large-scale fading models, such as shadowing, lognormal, and user-defined models. It also supports geometrical channel models. The fading channel emulator can also be upgraded to support both standard and user-defined power spectral densities (for antenna directivity).

Ordering Information

For purchasing or to obtain more detailed information on this or any of our other products or services, please contact Ukalta Engineering and we will be pleased to discuss how we can address your special requirements.

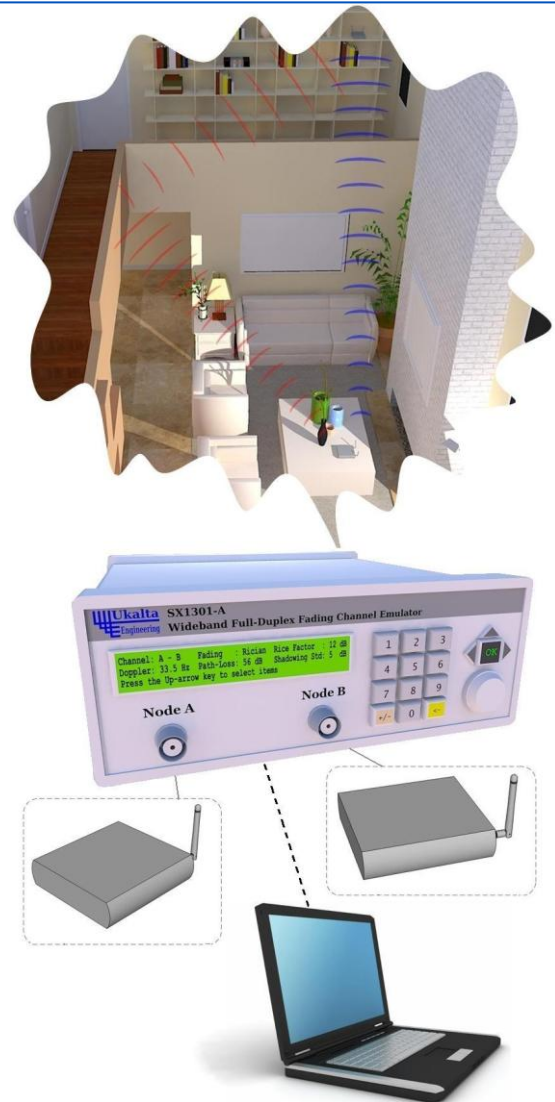


Figure 3: Performance evaluation of two wireless devices under various radio propagation channel scenarios

Ukalta Engineering Corporation

4344 Enterprise Square
10230 Jasper Avenue NW
Edmonton, Alberta, T5J 4P6
Canada

Toll-free: +1 (866) 393 1524
Phone: +1 (780) 701 1917
Fax: +1 (866) 380 3755

Email: contact@ukalta.com
Web: www.ukalta.com