Broadcast Channel Simulation Solution: Creating Realistic Wireless Communication Test Environments

Doewe Technologies Application Notes-040-V1.0

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1. Introduction

In the rapidly evolving field of wireless communications, swift technological progress and intense market competition continuously push the boundaries of the industry. With the vigorous development of emerging technologies such as 5G, the Internet of Things (IoT), and Vehicle-to-Everything (V2X), wireless communication systems face unprecedented challenges in complexity and diversity. To ensure these systems can operate stably and efficiently in various real-world environments, wireless communication testing has become an indispensable part of the product development process. In this technological revolution, the broadcast channel simulator, as a core device for wireless communication testing, is leading a new era with its outstanding performance and flexible applicability.

2. The Necessity of Broadcast Channel Simulation

The wireless communication environment is an extremely complex and variable system, encompassing various factors such as channel conditions, noise interference, multipath effects, and Doppler shifts. These factors not only affect signal transmission quality and stability but also directly determine the overall performance of wireless communication systems. Traditional testing methods, such as hardware-based simulation or simple signal generators, can no longer meet the demands of modern wireless communication systems for high-precision, highly complex test scenarios.

The broadcast channel simulator was born to address this issue. It can simulate various channel conditions such as Rayleigh fading, Rician fading, path loss, and shadowing, as well as key parameters like multipath effects, Doppler shifts, and spread. This capability constructs a highly realistic wireless communication environment. Such simulation is crucial for the development, testing, and optimization of wireless

communication systems.

Beijing Doewe Technologies Co., Ltd., targeting the complexity of the above channel environments, has launched the broadcast channel simulator ChnSml-BD. It focuses on solving issues such as inaccurate channel simulation, incomplete test scenario coverage, and difficulties in reproducing highly complex environments encountered during the R&D, testing, and optimization of wireless communication systems. ChnSml-BD enables R&D personnel to recreate various real-world channel conditions in a laboratory environment through highly flexible parameter configuration and powerful simulation capabilities. This allows for effective evaluation and optimization of wireless communication system performance. This not only significantly shortens product development cycles but also enhances system stability and reliability in practical applications.

3. Broadcast Channel Simulation Solution ChnSml-BD

（1） Product Overview

The ChnSml-BD broadcast channel simulator is meticulously crafted for equipment and system testing needs. It is dedicated to providing a realistic and convenient broadcast channel simulation environment for medium-wave (MW), short-wave (SW), and ultra-short-wave (USW) broadcast systems. This cross-band broadcast channel simulator integrates standard channel models with self-developed localized models for the China region, making it a high-end test instrument suitable for both indoor and outdoor field testing.

This simulator not only supports RF loopback testing to ensure result accuracy but

is also widely applicable in fields such as public communications and broadcasting, enabling precise simulation of real channel characteristics. Its adaptive application mode for typical scenarios provides users with a uniquely convenient operational experience.

Furthermore, with the continuous development of wireless communication technologies, new application scenarios and communication standards are constantly emerging, placing higher demands on wireless communication testing. The ChnSml-BD broadcast channel simulator, leveraging its flexibility and scalability, can easily meet these new challenges. It supports multiple input signals, static/dynamic scenarios, and channel conditions, allowing flexible configuration according to different testing needs. This flexibility not only improves testing efficiency but also reduces testing costs, providing strong support for the rapid iteration and optimization of wireless communication systems.

（2） Product Features

（3） Product Parameters

4. Doewe Solution

Doewe Technologies specializes in the development of channel simulation emulators and is committed long-term to providing realistic and precise channel environment simulation solutions for the medium-wave and short-wave test and measurement field. Advanced channel simulation emulators can highly reproduce complex communication scenarios, including various channel conditions, noise interference, multipath effects, and Doppler shifts, laying a solid foundation for the R&D, testing, and optimization of wireless communication systems. Beyond excellence in medium/short-wave test and measurement, Doewe Technologies also extensively serves the broadcasting & TV test and measurement, automotive electronics test and measurement, audio/video test and measurement, and general test & measurement and data acquisition fields. We provide these industries with professional test equipment,

solutions, and customized services. Whether it's monitoring the transmission quality of broadcasting and TV signals, EMC testing for automotive electronic devices, or performance evaluation of audio/video equipment, Doewe Technologies offers comprehensive technical support and assurance. We sincerely invite customers from all sectors to inquire and collaborate with us to jointly drive the continuous innovation and development of test and measurement technologies.