

## **Specifications for Third Generation/Fourth Generation Base Station Emulator**

*The Naval Research Laboratory has a requirement for a Base Station Emulator to test third generation and fourth generation equipment and protocols.*

The Base Station (BS) Emulator must have the following capabilities:

1. Establish a simulated link to the unit-under-test with the following features in accordance with the International Mobile Telecommunication-2000 (IMT-2000) specifications:

Provide specific signal and protocol messages to establish and maintain a code division multiple access (CDMA) links.

Provide a pilot channel to allow the unit-under-test to get short code timing alignment and frequency alignment, and a sync channel that broadcasts the state of the long code and system time to establish proper time alignment.

To create a link, the Emulator must call the unit-under-test via a paging channel.

Once on a simulated traffic channel, the BS Emulator must maintain the link by passing any required protocol message to the unit-under-test during testing.

In addition to supporting pilot, sync, paging, and traffic channels, the BS Emulator must provide other channels to simulate the nominal interference presented to a CDMA unit-under-test. Two noise sources are required: an Orthogonal Channel Noise Source (OCNS) to simulate the noise from other users in the same cell, and an Additive White Gaussian Noise (AWGN) source to simulate the noise from users in adjacent cells. All of these sources must be accurately calibrated and support relative amplitude resolution and accuracy of  $\pm 0.2$  to  $\pm 0.1$  decibel (dB).

2. Perform the following CDMA Transmitter Tests in accordance with the IMT-2000 specification:

Frequency Accuracy, CDMA Hard Hand-off, Time Reference Accuracy, Wave Form Quality, Range of Open-Loop Power Control, Time Response of Open-Loop Power Control, Access Probe Output Power, Range of Close-Loop Power Control, Maximum Radio Frequency Output Power, Minimum Controlled Power, Standby and Gated Output Power, Conducted Transmit (TX) Spurious Emissions, and Radiated TX Spurious Emissions.

3. Perform the following CDMA Receiver Tests in accordance with the IMT-2000 specification:

Demodulation of Paging Channel in AWGN, Demodulation of Forward Traffic Channel in AWGN, Demodulation of Forward Traffic Channel in Multipath Fading Channel, Soft Hand-Off Power Control Bits Tests, Receiver Sensitivity and Dynamic Range, Single-Tone Desensitization, Intermodulation Spurious Response Attenuation, and Receiver Spurious Emissions.

4. Perform the following CDMA Functions Tests in accordance with the IMT-2000 specification:

Softer Hand-off check  
Voice quality check

5. Support both CDMA-2000 and W-CDMA protocols.

The above capabilities (1, 2, 3, and 4) must be applicable to both CDMA-2000 and wide band code division multiple access (W-CDMA) protocols.