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| Channel Emulator |
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Channel Emulator

Dr: Yasmine Ali Fahmy

**Abstract:**

When talking about 4G Technology, 4G stands for Fourth Generation Technology and is successor of [3G Technology](http://mrintech.com/3g-in-india). In 2009, the [ITU-R](http://en.wikipedia.org/wiki/ITU-R) organization specified the **IMT-Advanced** (International Mobile Telecommunications Advanced) requirements for 4G standards, setting peak speed requirements for 4G service at 100 [Mbit/s](http://en.wikipedia.org/wiki/Megabits_per_second) (Mega bit per Second) for high mobility communication (such as from trains and cars) and 1 [Gbit/s](http://en.wikipedia.org/wiki/Gigabits_per_second) (Gega bit per Second) for low mobility communication (such as pedestrians and stationary users).

Integration in 4G means having different networks, different terminals and different services working together seamlessly

Wireless channel emulators are tools for [air interface](http://en.wikipedia.org/wiki/Air_interface) testing in [wireless communication](http://en.wikipedia.org/wiki/Wireless_communication). While testing air interface, [radio](http://en.wikipedia.org/wiki/Radio) channel emulators replace the real-world radio channel between a radio [transmitter](http://en.wikipedia.org/wiki/Transmitter) and a [receiver](http://en.wikipedia.org/wiki/Receiver_%28radio%29). Radio channel emulator enables creation of mathematical model representing the physical radio signal transmission medium.

In this project, we replace the real world with a channel emulator based on the IMT advanced systems report and implementing it on Xilinx ML405 virtex 4 FPGA.

**CONCLUSION:**

When a signal is sent over a radio channel, it is distorted in many different ways. The received signal often hardly resembles the signal that was initially sent. On its path between the transmitter and the receiver there are many different effects to which the signal is it subject. These effects differ depending on the characteristics of the channel over which the signal is sent.

A channel is defined as the medium over which a signal is sent and includes all the effects that the medium has on a signal. For instance, when a signal is sent through a wire. The wire along with all its characteristics, such as electromagnetic interference, is considered to be the channel. For wireless signals, therefore, the air over which the signal is sent is considered to be the channel.

Wireless channel emulators are important tools for testing radio devices, especially in mobile environments. The radio antenna ports are directly connected to the emulator test bed and the channel is simulated in real time with hardware. The emulator replicates the distortion from the wireless channel on the physical signals from the radios. The emulator channel properties can be updated through software so the simulated environments can be easily controlled. Emulators are much more realistic than computer simulations because real radio hardware is used to transmit and receive the radio frequency (RF) signals.