Diseño del Frente Digital de un Transceiver BPL

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Laboratorio de Procesamiento de Señales y Comunicaciones

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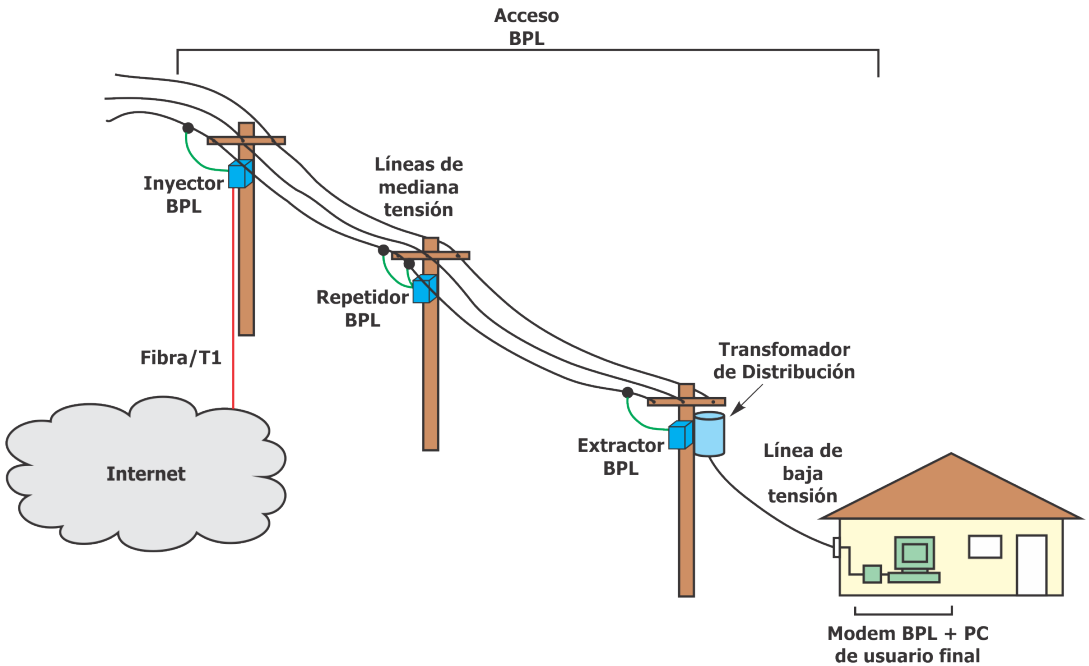
Broadband over Power Lines



Tipo de Transmisión	Frec. de Transmisión
Radio AM	530-1600 KHz
Radio FM	88-108 MHz
VHF TV	178-216 MHz
Radio Celular	850 MHz
Indoor Wireless Networks	1.8GHz
Satellite Downlink	3.7-4-2 GHz
Satellite Uplink	5.9-6.4 GHz
Fibra Óptica	2×10^{14} Hz
BPL	1-30 MHz

PLC:

Open PLC European

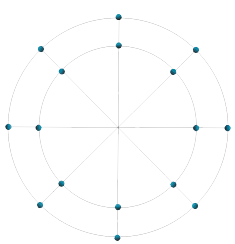
Research Alliance (OPERA).

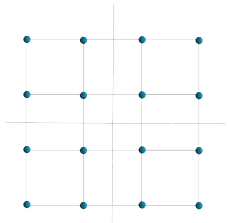
BPL:

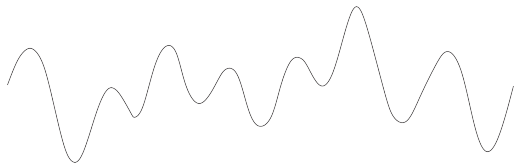
Institute of Electrical

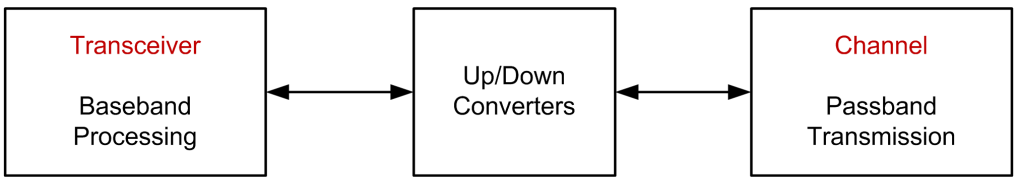
and Electronics Engineers (IEEE).

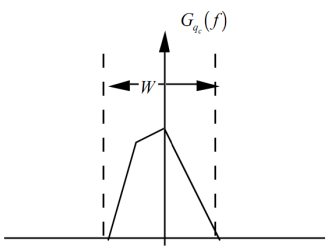
Up/Down Conversion

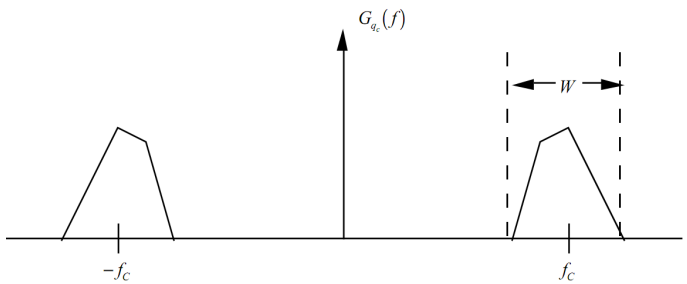




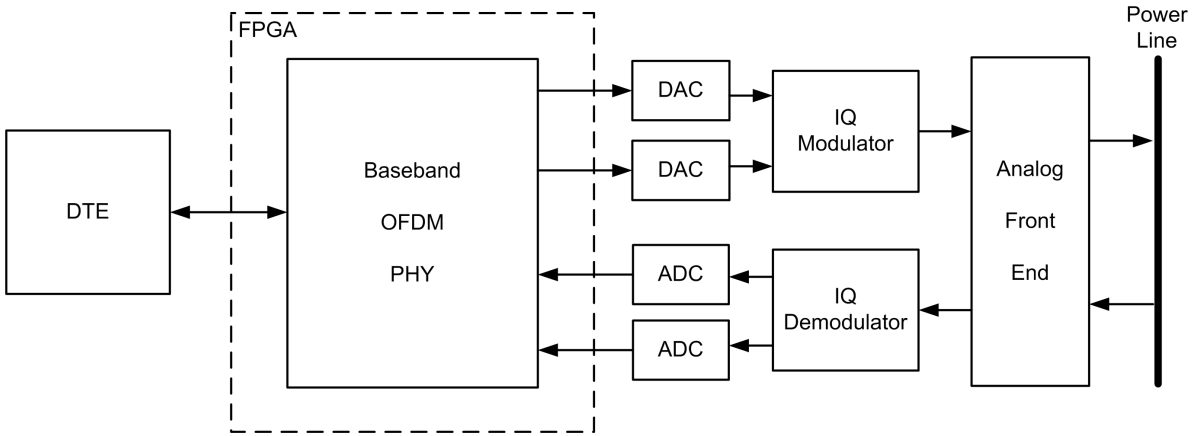




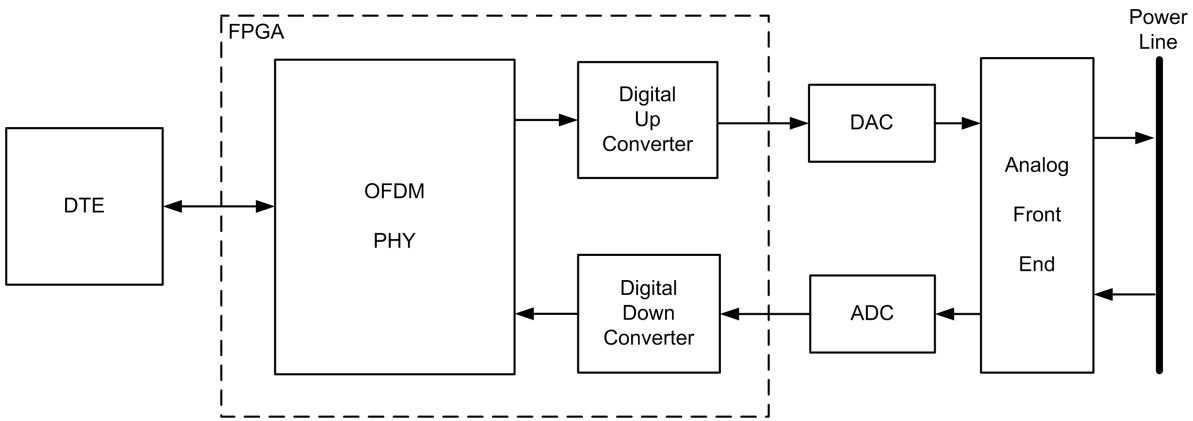




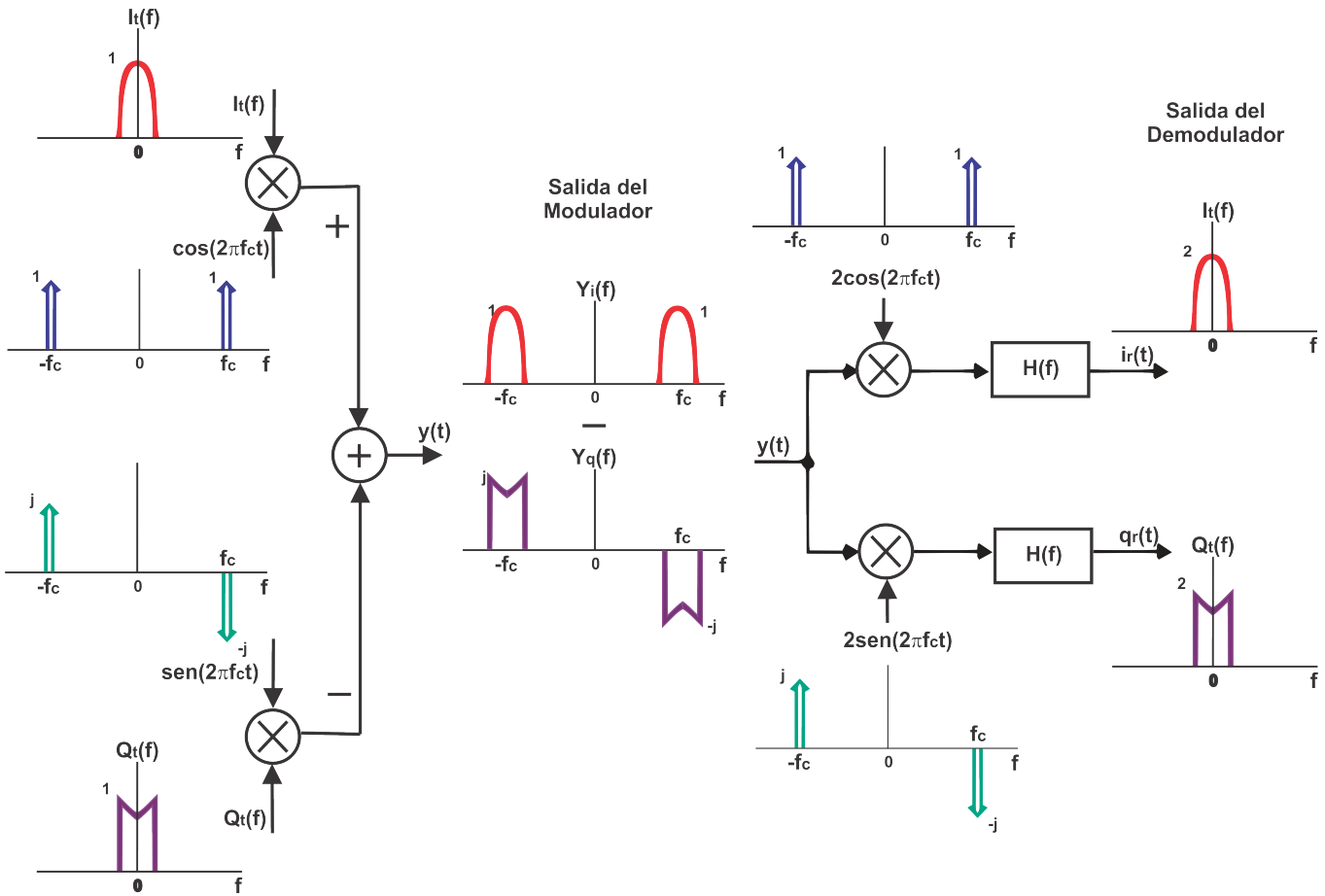
Analog Up/Down Conversion

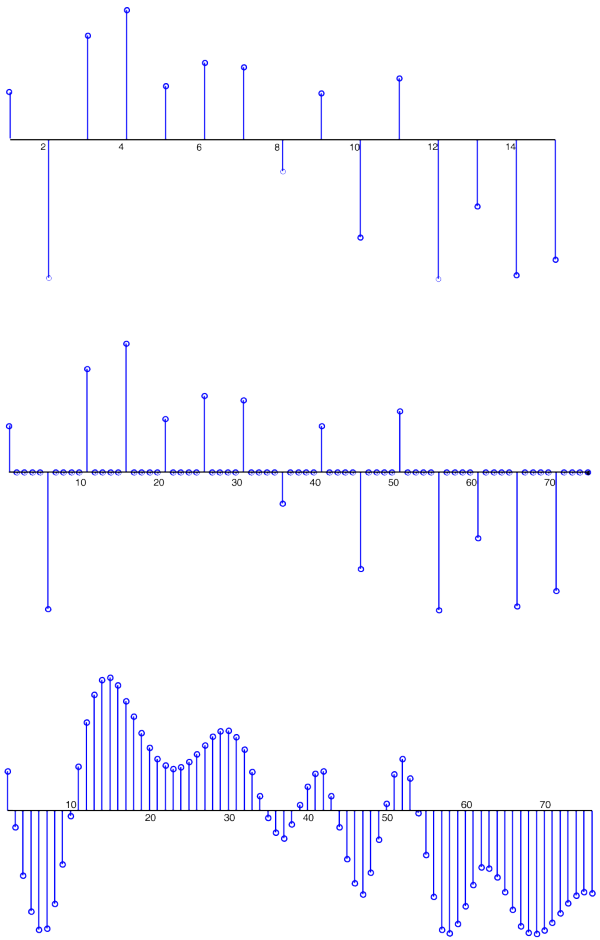


Digital Up/Down Conversion

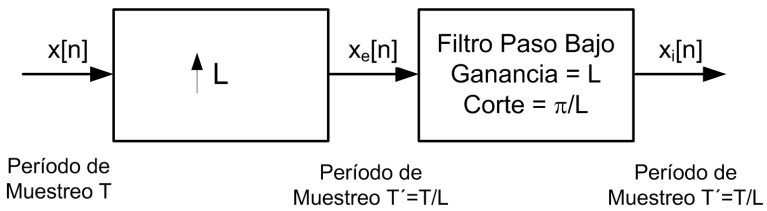


Modulación/Demodulación IQ

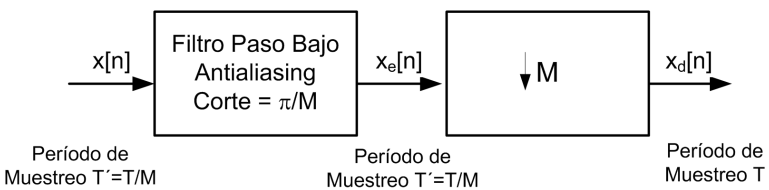




Interpolación

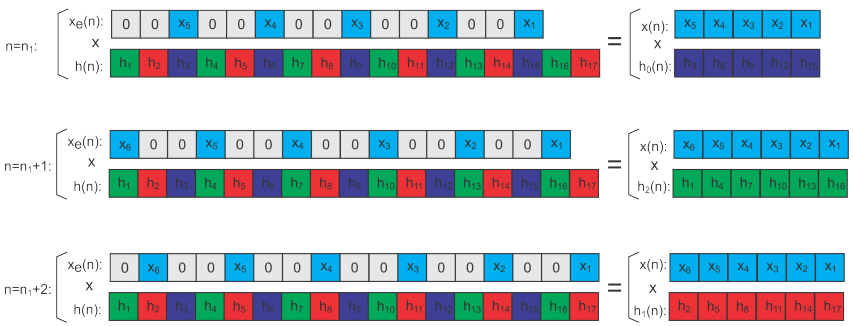


Decimación



Descomposiciones Polifásicas Equivalentes

Interpolación



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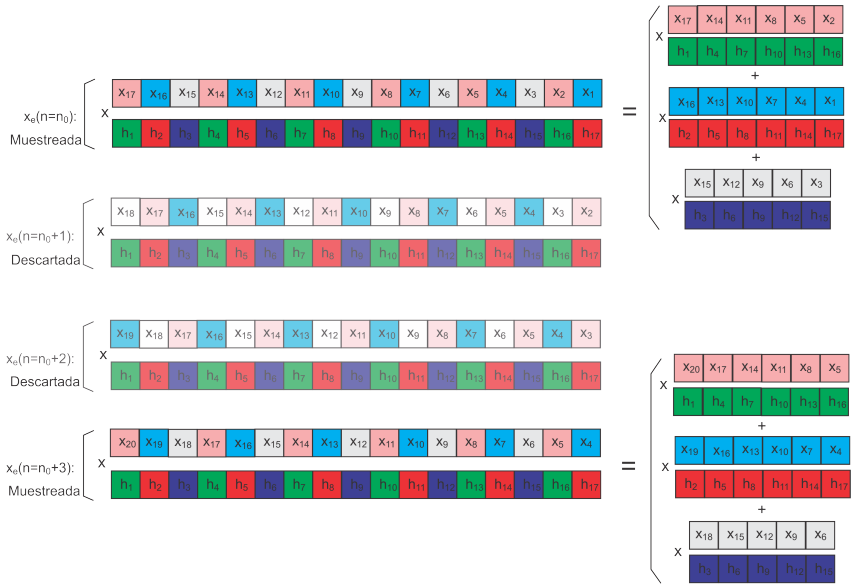
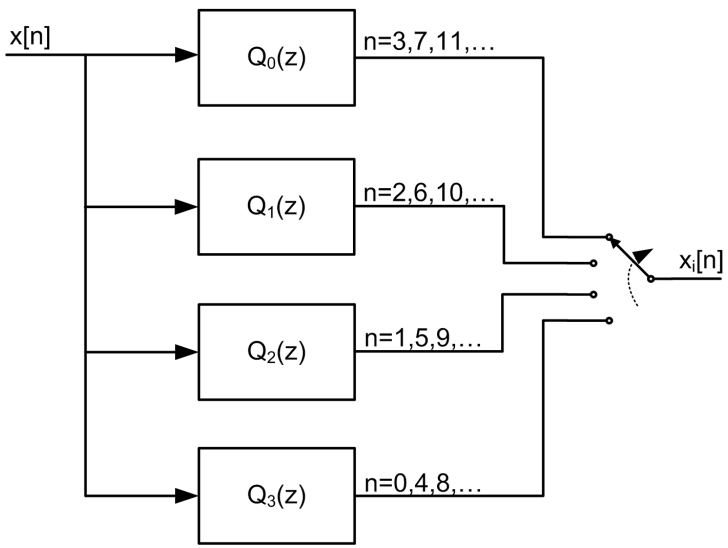
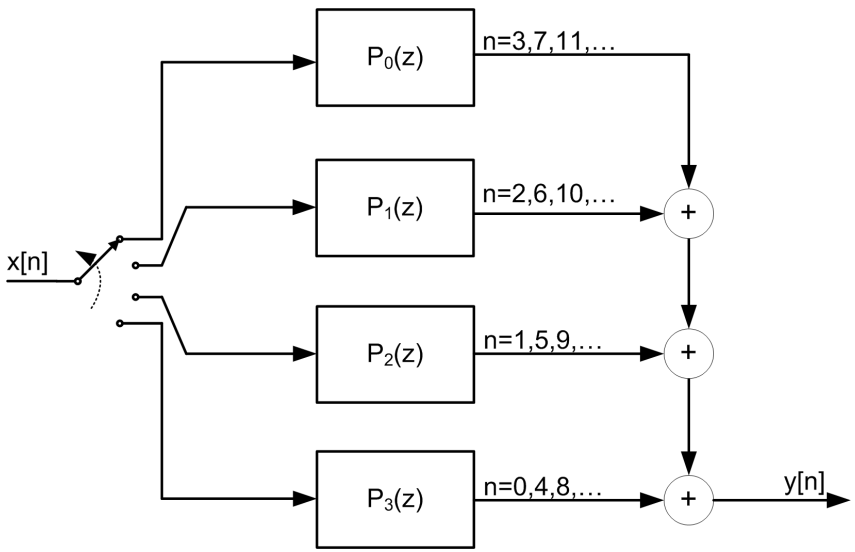


Descomposiciones Polifásicas Equivalentes

Interpolación

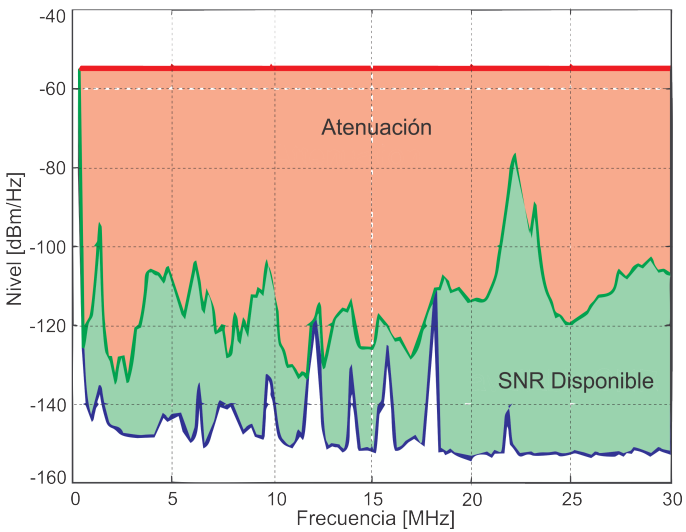


Decimación



Medidas de Performance

Canal de Transmisión



Mean Square Error:

$$MSE = \frac{1}{M \cdot N} \cdot \sum_{k=1}^{M \cdot N} |S(k) - S_0(k)|^2$$

Error Vector Magnitude:

$$\Rightarrow EVM = \sqrt{\frac{\frac{1}{M\,N} \cdot \sum_{k=1}^{M \cdot N} |S(k) - S_0(k)|^2}{\frac{1}{M\,N} \cdot \sum_{k=1}^{M \cdot N} |S_0(k)|^2}} \cdot 100\,\%$$

Signal-to-Noise Ratio:

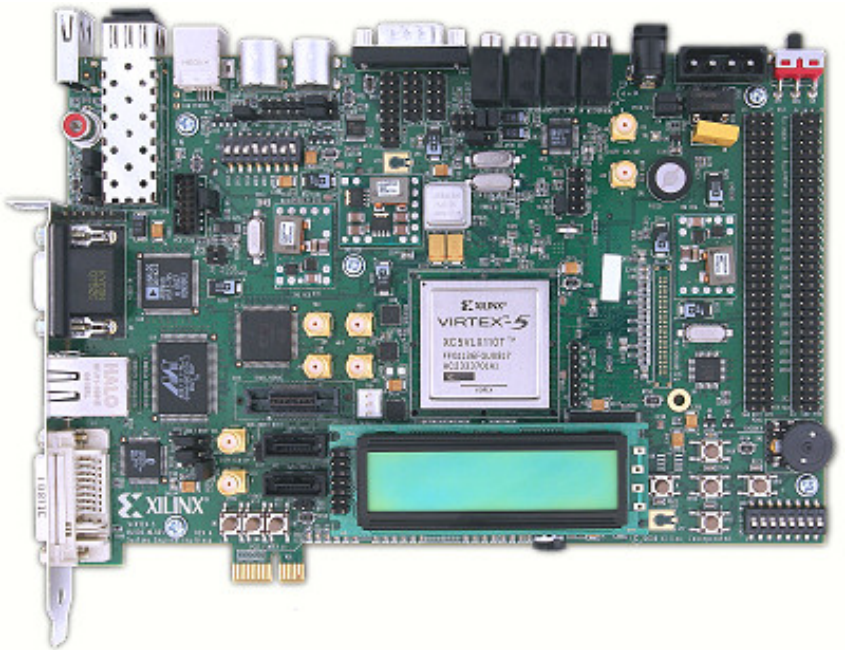
$$SNR = 10 \cdot log_{10} \left(\frac{\frac{1}{K} \sum |x[n]|^2}{\frac{1}{K} \sum e[n]^2} \right) \quad [dB]$$

Plataforma física: Field-Programmable Gate Array (FPGA)

Xilinx provee amplias herramientas de diseño

Virtex-5 OpenSPARC Evaluation Platform

Xilinx Virtex®-5 XC5VLX110T



Herramienta de diseño y simulación: Xilinx System Generator for DSP

Corre sobre *Simulink* agregando sets de bloques propios.

Genera automáticamente, a partir del sistema construído, el código en VHDL.

Permite integrar al sistema scripts generados en *Matlab*, y admite importar y exportar datos a su workspace.