MQAM system

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Binary Source

This block generates a sequence of binary values (1 or 0) and it can work in four different modes:

- Random
- PseudoRandom
- DeterministicCyclic
- DeterministicAppendZeros

Input Parameters

- mode
- probabilityOfZero
- patternLength
- bitStream
- numberOfBits
- bitPeriod

Functional description

Random Mode: generates a 0 with probability *probabilityOfZero* and a 1 with probability 1-*probabilityOfZero*.

Pseudorandom Mode: generates a pseudorandom sequence with period $2^{patternLength} - 1$.

DeterministicCyclic Mode: generates the sequence of 0's and 1's specified by *bitStream* and then repeats it.

DeterministicAppendZeros Mode: generates the sequence of 0's and 1's specified by *bitStream* and then it fills the rest of the buffer space with zeros.

Input Signals

Number: 0 or 1 (which would work as a trigger)

Type: Binary (DiscreteTimeDiscreteAmplitude)

Output Signals

Number: 1 or more

Type: Binary (DiscreteTimeDiscreteAmplitude)

Examples

Random Mode

PseudoRandom Mode

As an example consider a pseudorandom sequence with *patternLength*=3 which contains a total of 7 ($2^3 - 1$) bits. In this sequence it is possible to find every combination of 0's and 1's that compose a 3 bit long subsequence with the exception of 000. For this example the possible subsequences are 100, 010, 001, 110, 101, 011 and 111. Some of these require wrap.

DeterministicCyclic Mode
DeterministicAppendZeros Mode

M-QAM mapper

This block does the mapping of the binary signal using a m-QAM modulation. It atributes to each pair of bits a point in the I-Q space. The constellation is defined by the *iqAmplitudes* vector.

Input Parameters

- m
- iqAmplitudes

Functional Description

Input Signals

Number: 1
Type: Binary (DiscreteTimeDiscreteAmplitude)

Output Signals

Number: 2
Type: Sequence of 1's and -1's (DiscreteTimeDiscreteAmplitude)

Examples

Sugestions for future improvement

Discrete to Continuous Time

This block converts a signal from a discrete time signal to a continuous time signal. To do so it reads the input signal buffer value, puts it in the output signal buffer and it fills the rest of the space available for thar symbol with zeros.

Input Parameters

- numberOfSamplesPerSymbol

Functional Description

Input Signals

Number: 1
Type: Sequence of 1's and -1's. (DiscreteTimeDiscreteAmplitude)

Output Signals

Number: 2
Type: Sequence of Dirac Delta functions (ContinuousTimeDiscreteAmplitude)

Example

Sugestions for future improvement

Pulse Shapper

This blocks applies a raised-cosine filter to the signal. The filter's transfer function is defined by the vector *impulseResponse*.

Input Parameters

- filterType
- impulseResponseTimeLength
- rollOfFactor

Functional Description

Input Signals

Number: 1
Type: Sequence of Dirac Delta functions (ContinuousTimeDiscreteAmplitude)

Output Signals

Number: 1
Type: Sequence of impulses modulated by the filter (ContinuousTimeContiousAmplitude)

Example

Sugestions for future improvement

Introduce other types of filters.

IQ Modulator

This blocks takes the two input signals that correspond to the part of the signal in phase and in quadrature and produces a complex signal, that contains information about the amplitude and phase.

Input Parameters

- outputOpticalPower
- outputOpticalWavelength
- outputOpticalFrequency

Functional Description

The complex signal is multiplied by $\frac{1}{2}\sqrt{outputOpticalPower}$ in order to reintroduce the information about the energy (or power) of the signal. This information was omitted ...

Input Signals

Number: 2
Type: Sequence of impulses modulated by the filter (ContinuousTimeContiousAmplitude))

Output Signals

Number: 1
Type: Complex signal (ContinuousTimeContiousAmplitude)

Example

Sugestions for future improvement