Package ‘hopbyhop’

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Type Package

Title Transmissions and Receptions in a Hop by Hop Network

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Description Computes the expectation of the number of transmissions and receptions considering a Hop-by-Hop transport model with limited number of retransmissions per packet. It provides the theoretical results shown in Palma et. al.(2016) <DOI:10.1109/TLA.2016.7555237> and also estimated values based on Monte Carlo simulations. It is also possible to consider random data and ACK probabilities.

License GPL (>= 2)

Imports pastecs, ggplot2

Suggests endtoend, Opportunistic

NeedsCompilation no

Repository CRAN

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R topics documented:

HBH ................................................................. 2
MCHBH ............................................................ 3
stochastic_HBH ................................................. 4

Index 7
**Description**

This function computes the expected value of the number of transmissions/receptions for Hop by hop model with L-limited retransmissions per packet.

**Usage**

\[ \text{hbh}(p_1, p_2, L, N) \]

**Arguments**

- \( p_1 \) Data success probability
- \( p_2 \) ACK success probability
- \( L \) Maximum number of retransmissions.
- \( N \) Number of Hops

**Details**

When there is no limitation, \( L \) value must be set as \( L=\infty \).

**Value**

The output is a matrix containing the following values for each hop and total:

1. Success Probability
2. Expected Data Transmissions
3. Expected ACK Transmissions
4. Expected Total Transmissions
5. Expected Data Receptions
6. Expected ACK Receptions
7. Expected Total Receptions

**Author(s)**

Christian E. Galarza and Jonathan M. Olate
References


See Also

MCHBH, stochastic_HBH

Examples

#An N=5 Hop by hop system with limited L=7 retransmission per hop
HBH(p1=0.65,p2=0.4,L=7,N=5)

#An unlimited N=5 Hop by hop system
HBH(p1=0.65,p2=0.4,L=Inf,N=5)

Description

This function compute the mean of the number of transmissions/receptions for Hop by hop model with L-limited retransmissions per packet simulating via Monte Carlo.

Usage

MCHBH(p1, p2, L, N, M = 5000)

Arguments

p1            Data success probability
p2            ACK success probability
L             Maximum number of retransmissions
N             Number of Hops
M             Number of Monte Carlo Simulations
Value

The output is a matrix containing the following values for each hop and total:

1. MC Success Probability
2. MC Mean Data Transmissions
3. MC Mean ACK Transmissions
4. MC Mean Total Transmissions
5. MC Mean Data Receptions
6. MC Mean ACK Receptions
7. MC Mean Total Receptions

Author(s)

Christian E. Galarza and Jonathan M. Olate

References


See Also

HBH, stochastic_HBH

Examples

# Monte Carlo simulations for an N=5 Hop by hop system
# with limited L=7 retransmission per hop

MCHBH(p1=0.65,p2=0.4,L=7,N=5)

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stochastic_HBH  Random Probabilities Monte Carlo transmissions/receptions simulations for a L-limited Hop by Hop model

Description

This function compute the mean of the number of transmissions/receptions for Hop by Hop model with L-limited retransmissions per packet simulating via Monte Carlo.
stochastic_HBH

Usage

stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L,N,M=10^5,printout=TRUE,plotspdf=TRUE)

Arguments

dist1 For the data success probability: probability density function. Options are "uniform" and "beta".
p11 For the data success probability: lower limit of the uniform distribution (dist1 == "uniform")
or shape1 (alpha) parameter of a Beta distribution (dist1 == "beta").
p12 For the data success probability: upper limit of the uniform distribution (dist1 == "uniform")
or shape2 (beta) parameter of a Beta distribution (dist1 == "beta").
dist2 For the ACK success probability: probability density function. Options are "uniform" and "beta".
p21 For the ACK success probability: lower limit of the uniform distribution (dist1 == "uniform")
or shape1 (alpha) parameter of a Beta distribution (dist1 == "beta").
p22 For the ACK success probability: upper limit of the uniform distribution (dist1 == "uniform")
or shape2 (beta) parameter of a Beta distribution (dist1 == "beta").
L Maximum number of retransmissions
N Number of Hops
M Number of Monte Carlo Simulations
printout If TRUE (by default), the function prints some outputs and plots
plotspdf If TRUE (by default), the function exports all plots in pdf in the working directory

Value

The output is a matrix containing two elements:

data a dataframe containing all Monte Carlo replications
stats descriptive statistics

for

1 p1
2 p2
1 Success Probability
2 Expected Data Transmissions
3 Expected ACK Transmissions
4 Expected Total Transmissions
5 Expected Data Receptions
6 Expected ACK Receptions
7 Expected Total Receptions
Author(s)
Christian E. Galarza and Jonathan M. Olate

References

See Also
HBH, MCHBH

Examples
#Monte Carlo simulations for an N=5 Hop by Hop system
#with limited L=7 retransmission per hop

#We now consider p1 ~ Uniform(0.2,0.6)
dist1 = "uniform"
p11 = 0.2
p12 = 0.6

#and p2 ~ Beta(3,1)
dist2 = "beta"
p21 = 3
p22 = 1

#no outputs and plots
out = stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L=7,N=5,M=5*10^3,printout=FALSE,plotpdf=FALSE)
out$data #simulations
out$stats #resume

#uncomment next line for outputs plots and pdf file
#out = stochastic_HBH(dist1,p11,p12,dist2,p21,p22,L=7,N=5)
Index

*Topic **Hop by Hop**
  HBH, 2
  MCHBH, 3
*Topic **Hop by hop**
  stochastic_HBH, 4
*Topic **network**
  HBH, 2
  MCHBH, 3
  stochastic_HBH, 4
*Topic **receptions**
  HBH, 2
  MCHBH, 3
  stochastic_HBH, 4
*Topic **transmissions**
  HBH, 2
  MCHBH, 3
  stochastic_HBH, 4

HBH, 2, 4, 6
MCHBH, 3, 3, 6
stochastic_HBH, 3, 4, 4