Package ‘endtoend’

July 7, 2019

Type Package

Title Transmissions and Receptions in an End to End Network

Version 2.29

Date 2019-06-07

Author Christian E. Galarza, Jonathan M. Olate

Maintainer Christian E. Galarza <cgalarza88@gmail.com>

Description Computes the expectation of the number of transmissions and receptions considering an End-to-End transport model with limited number of retransmissions per packet. It provides theoretical results 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 hopbyhop, Opportunistic

NeedsCompilation no

Repository CRAN

Date/Publication 2019-07-06 22:04:53 UTC

R topics documented:

ETE .................................................. 2
MCETE .................................................. 3
stochastic_ETE ......................................... 4

Index 7
Theoretical transmissions/receptions for a L-limited End to End model

Description
This function computes the expected value of the number of transmissions/receptions for End to End model with L-limited retransmissions per packet.

Usage
ETE(p1, p2, L, N)

Arguments
- p1: Data success probability
- p2: 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=Inf.

Value
The output is a matrix containing the following values:
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

MCETE, stochastic_ETE

Examples

An N=5 End to End system with limited L=7 retransmission per hop
ETE(p1=0.65, p2=0.4, L=7, N=5)

An unlimited N=5 End to End system
ETE(p1=0.65, p2=0.4, L=Inf, N=5)

Description

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

Usage

MCETE(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:

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
stochastic_ETE

Author(s)
Christian E. Galarza and Jonathan M. Olate

References

See Also
ETE, stochastic_ETE

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

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

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

Usage
stochastic_ETE(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".
For the ACK success probability: lower limit of the uniform distribution \((\text{dist1} == \text{"uniform"})\) or shape1 (alpha) parameter of a Beta distribution \((\text{dist1} == \text{"beta"})\).

For the ACK success probability: upper limit of the uniform distribution \((\text{dist1} == \text{"uniform"})\) or shape2 (beta) parameter of a Beta distribution \((\text{dist1} == \text{"beta"})\).

**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**

ETE, MCETE
Examples

# Monte Carlo simulations for an N=5 End to End 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 pR ~ Beta(3,1)
distR = "beta"
pR1 = 3
pR2 = 1

# no outputs and plots
out = stochastic_ete(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_ete(dist1,p11,p12,dist2,p21,p22,L=7,N=5,M=5*10^3)
Index

*Topic End to End
  ETE, 2
  MCETE, 3
  stochastic_ETE, 4

*Topic network
  ETE, 2
  MCETE, 3
  stochastic_ETE, 4

*Topic receptions
  ETE, 2
  MCETE, 3
  stochastic_ETE, 4

*Topic transmissions
  ETE, 2
  MCETE, 3
  stochastic_ETE, 4

ETE, 2, 4, 5
MCETE, 3, 3, 5
stochastic_ETE, 3, 4, 4