

# Package ‘endtoend’

October 13, 2022

**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
<b>Index</b>	<b>7</b>

---

ETE *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**

- Heimlicher, S., Nuggehalli, P., & May, M. (2007). End-to-end vs. hop-by-hop transport. ACM SIGMETRICS Performance Evaluation Review, 35(3), 59.
- Heimlicher, S., Karaliopoulos, M., Levy, H., & May, M. (2007). End-to-end vs. Hop-by-hop Transport under Intermittent Connectivity (Invited Paper). Proceedings of the First International Conference on Autonomic Computing and Communication Systems.

**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)
```

---

MCETE	<i>Monte Carlo transmissions/receptions simulations for a L-limited End to End model</i>
-------	--

---

**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

**Author(s)**

Christian E. Galarza and Jonathan M. Olate

**References**

Heimlicher, S., Nuggehalli, P., & May, M. (2007). End-to-end vs. hop-by-hop transport. *ACM SIGMETRICS Performance Evaluation Review*, 35(3), 59.

Heimlicher, S., Karaliopoulos, M., Levy, H., & May, M. (2007). End-to-end vs. Hop-by-hop Transport under Intermittent Connectivity (Invited Paper). *Proceedings of the First International Conference on Autonomic Computing and Communication Systems*.

**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)
```

---

stochastic_ETE	<i>Random Probabilities Monte Carlo transmissions/receptions simulations for a L-limited End to End model</i>
----------------	---

---

**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".

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**

- Heimlicher, S., Nuggehalli, P., & May, M. (2007). End-to-end vs. hop-by-hop transport. *ACM SIGMETRICS Performance Evaluation Review*, 35(3), 59.
- Heimlicher, S., Karaliopoulos, M., Levy, H., & May, M. (2007). End-to-end vs. Hop-by-hop Transport under Intermittent Connectivity (Invited Paper). *Proceedings of the First International Conference on Autonomic Computing and Communication Systems*.

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

#no outputs and plots
out = stochastic_ETE(dist1,p11,p12,dist2,p21,p22,L=7,N=5,M=5*10^3,printout=FALSE,plotspdf=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

- \* **End to End**

- ETE, 2

- MCETE, 3

- stochastic\_ETE, 4

- \* **network**

- ETE, 2

- MCETE, 3

- stochastic\_ETE, 4

- \* **receptions**

- ETE, 2

- MCETE, 3

- stochastic\_ETE, 4

- \* **transmissions**

- ETE, 2

- MCETE, 3

- stochastic\_ETE, 4

ETE, 2, 4, 5

MCETE, 3, 3, 5

stochastic\_ETE, 3, 4, 4