

# On the possibility of turning an arbitrary graph into a complex network, using rewiring mechanisms

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**Abstract**—The abstract goes here.

**Index Terms**—Computer Society, IEEE, IEEEtran, journal, L<sup>A</sup>T<sub>E</sub>X, paper, template.



## 1 INTRODUCTION

THIS demo file is intended to serve as a “starter file” for IEEE Computer Society journal papers produced under L<sup>A</sup>T<sub>E</sub>X using IEEEtran.cls version 1.8b and later. I wish you the best of success.

mds  
August 26, 2015

### 1.1 Subsection Heading Here

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## 2 RELATED WORK

## 3 METHODS

### 3.1 General operation

- Frequency of use of dynamic links during the exploration phase ( $f_e$ ).
- Frequency of visits to candidate nodes during the exploration phase ( $f_n$ ).

### 3.2 Initial conditions

#### 3.2.1 Initial graph

#### 3.2.2 routing algorithm

Se lanzan 20 paquetes - (numero de nodos)

Numero de brazo dinamicos / longitud D (routing)

Two-dimensional grid graph (Kleinberg - navegability)

Compass routing

#### 3.2.3 Coordinator election

### 3.3 Rewiring mechanism

The rewiring mechanism is a distributed process executed a determined number of cycles. A cycle of the rewiring mechanism consist of the following phases:

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Manuscript received April 19, 2005; revised August 26, 2015.

#### 3.3.1 Exploration

During this phase, each node sequentially sends twenty tracer packets to arbitrary destination nodes. Destination nodes respond to a tracer packet with an acknowledgment packet containing the information on the path followed by the tracer packet. Tracer and acknowledgements packets are routed applying compass routing. When a node receives an acknowledgment packet, it updates its vectors  $f_e$  and  $f_n$  with the information. A node finishes its exploration phase when it has received all the acknowledgements packets from all destinations.

#### 3.3.2 Exploration synchronization

This phase starts when the coordinator node has finished its exploration phase. Then it starts a PIF algorithm to spread messages asking if the rest of nodes have finished its exploration phase. When the coordinator node receives a response of all the nodes in the network, it starts a PI algorithm to spread messages notifying that nodes must start its rewiring phase.

#### 3.3.3 Rewiring

Each node starts its rewiring phase when it receives a notification from the coordinator. Then, the notified node uses the information in its vectors  $f_e$  and  $f_n$  to take a rewiring decision according to one of the following rules:

- **Rule 1.** The node rewires its least used dynamic link (according with  $f_e$ ) to the most visited node (according to  $f_n$ ).
- **Rule 2.** The node rewires its least used dynamic link (according with  $f_e$ ) to the first node at distance 2 from it. Said node is the first node in  $f_n$ .

#### 3.3.4 Rewiring synchronization

Analogous to the *Exploration Synchronization phase*, this phase starts when the coordinator node has finished its rewiring phase. Then it starts a PIF algorithm to spread messages asking if the rest of nodes have finished its rewiring phase. When the coordinator node receives a response of all the nodes in the network, it starts a PI algorithm to spread messages notifying that the cycle has finished and nodes must start a new cycle.

## 4 RESULTS

### 4.1 Impact of the initial graph

### 4.2 Impact of the routing algorithm

### 4.3 Impact of the number of exploration packets

### 4.4 Impact of the length of dynamic link

### 4.5 Información para recableo

- Medir los paquetes

Reglas de recableo - Actualizar en distintos ciclos

- Longitud a distancia en el grafo u otro espacio no euclidiano

- Propagación de epidemias

## 5 CONCLUSION

The conclusion goes here.

## APPENDIX A

### PROOF OF THE FIRST ZONKLAR EQUATION

Appendix one text goes here.

## APPENDIX B

Appendix two text goes here.

## ACKNOWLEDGMENTS

The authors would like to thank...

## REFERENCES

- [1] H. Kopka and P. W. Daly, *A Guide to L<sup>A</sup>T<sub>E</sub>X*, 3rd ed. Harlow, England: Addison-Wesley, 1999.



**Michael Shell** Biography text here.

**John Doe** Biography text here.

**Jane Doe** Biography text here.