

Collision Prevention in Distributed 6TiSCH Networks

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Introduction & Background

- General Introduction

- IEEE802.15.4 Protocols

- Project challenges & Objectives

Proposed Mechanism

- Using 6top Transaction

- Avoid Table

- Cell Buffer

- Housekeeping Approach

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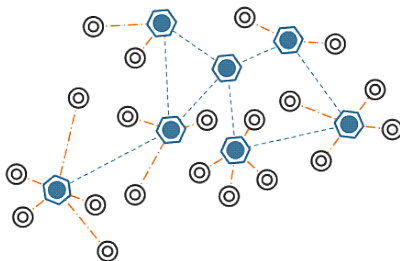
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General Introduction

IoT & Wireless Sensor Networks

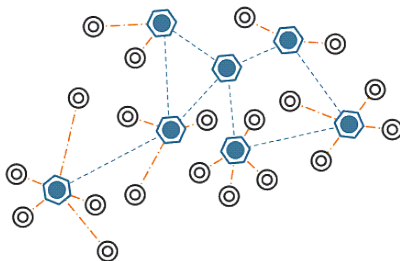
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General Introduction

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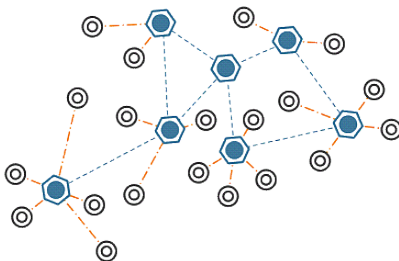
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- ▶ WSN: standardization of IoT nodes communication.



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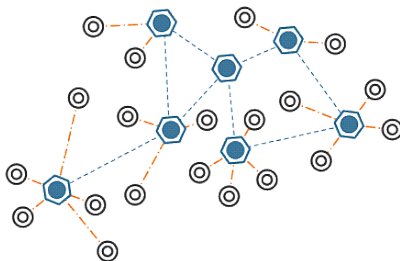
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General Introduction

IoT & Wireless Sensor Networks

- ▶ Network technologies and IoT.
- ▶ WSN: standardization of IoT nodes communication.
- ▶ Main contributions are : low power consumption, low cost.
- ▶ IEEE802.15.4 one of the main standards of WSN.

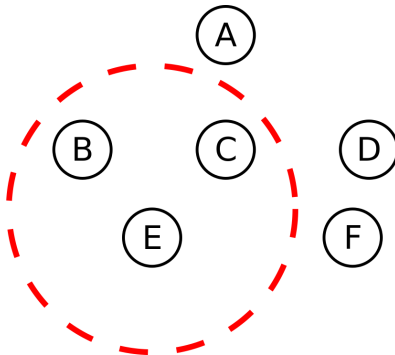


General introduction

IEEE802.15.4

Converge Cast Structure

- ▶ Nodes radio ranges defines the neighborhood.

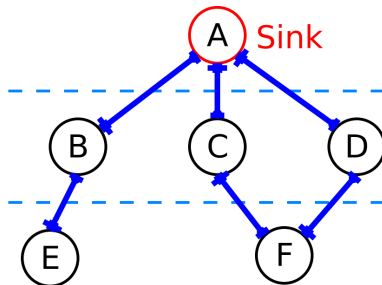


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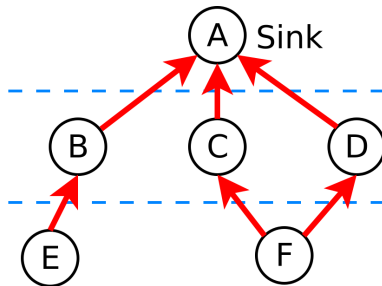


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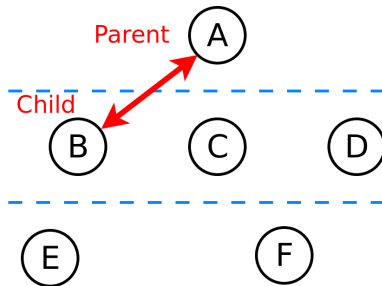


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- ▶ Communication pairs.



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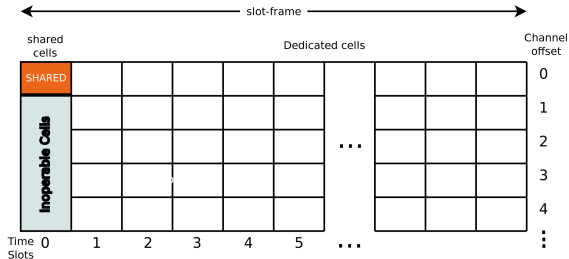
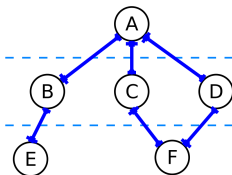
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IEEE802.15.4 Protocols

IEEE802.15.4e TSCH

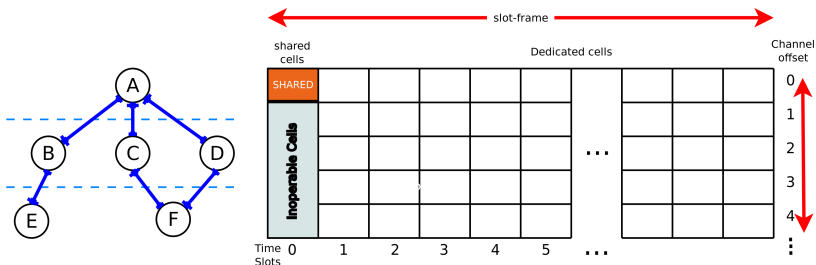
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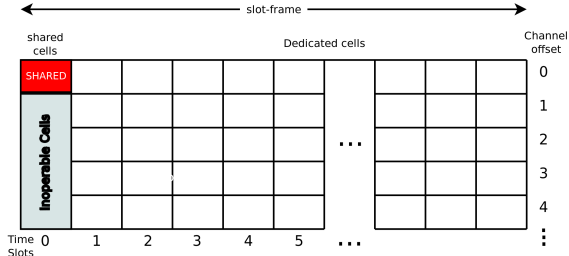
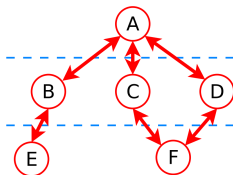
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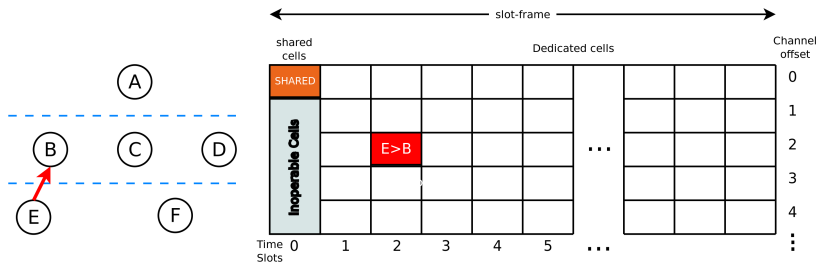
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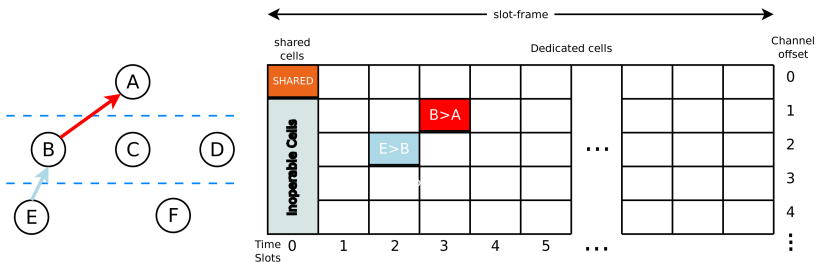
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6TiSCH

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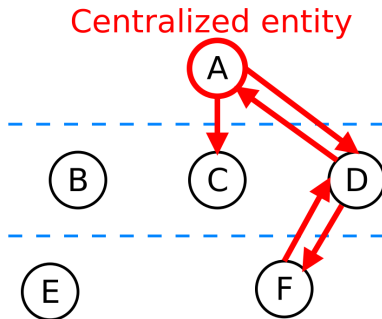
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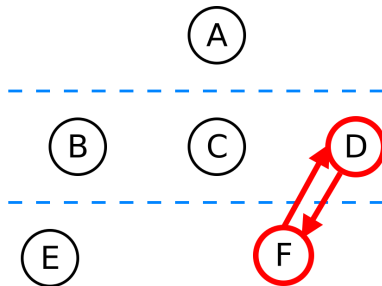
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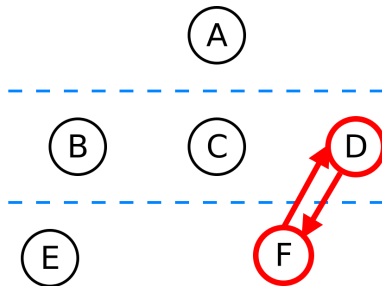
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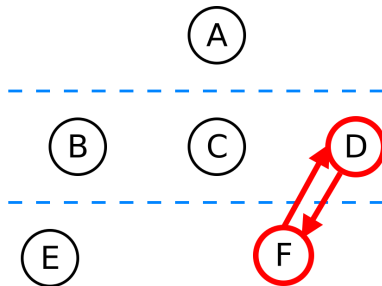
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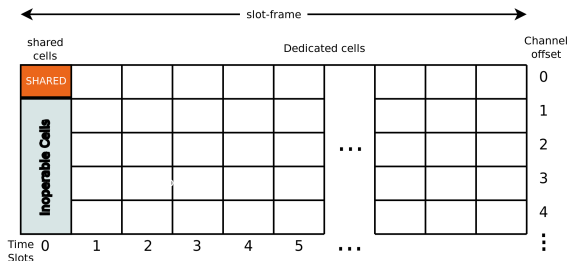
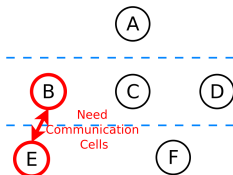
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 - ▶ Scheduling function.



IEEE802.15.4 Protocols

Cell Reservation Process

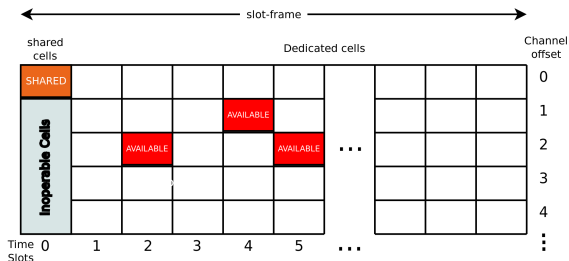
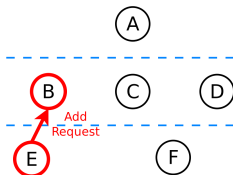
- Scheduling function decides new cell should be assigned.



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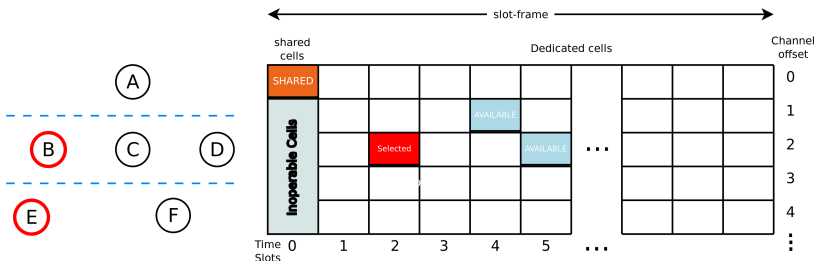
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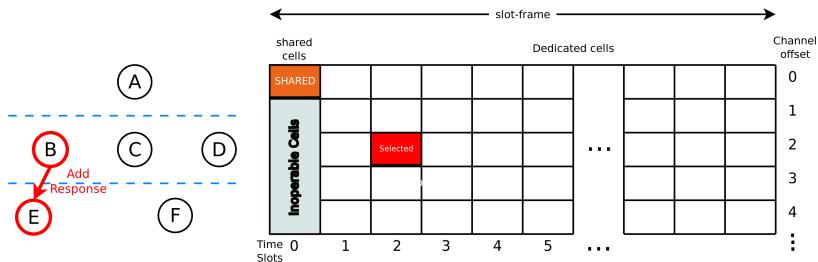
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- ▶ Scheduling function decides which cells to be selected.



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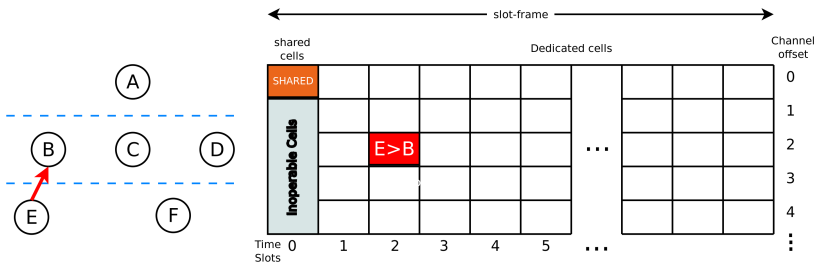
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Cell Reservation Process

- ▶ Scheduling function decides new cell should be assigned.
- ▶ Child node sends an Add request.
- ▶ Scheduling function decides which cells to be selected.
- ▶ Parent node replies with an Add response.
- ▶ Cell is added and communication start.



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Collision in Dedicated Cells

- ▶ Collision free Dedicated Cells?

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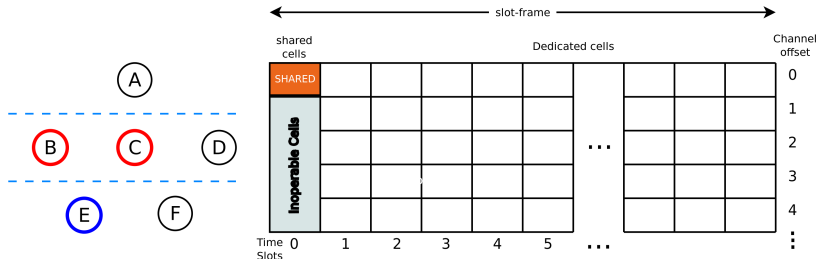
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Project challenges & Objectives

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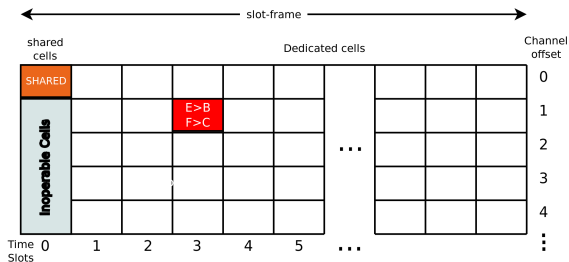
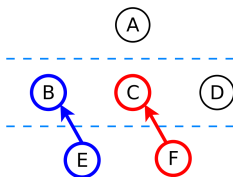
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Project challenges & Objectives

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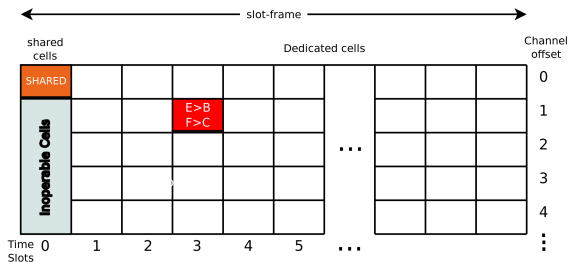
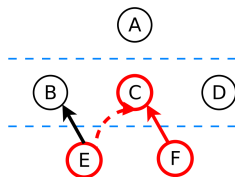
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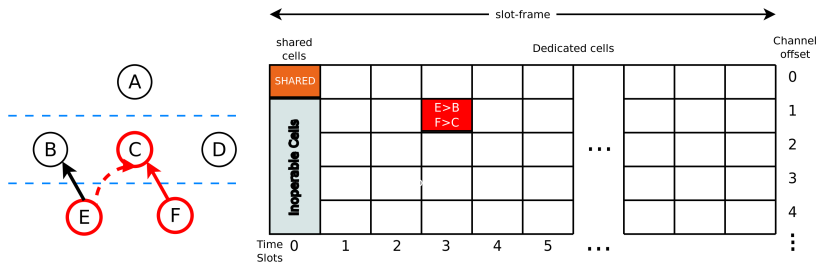
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Project challenges & Objectives

Collision in Dedicated Cells

- ▶ Collision free Dedicated Cells?
- ▶ No central entity in distributed approach.
- ▶ Neighbor nodes can select the same communication cell.
- ▶ Collision at the reception Node.
- ▶ Collision in terms of power, latency.



Project challenges & Objectives

Collision in Dedicated Cells

- ▶ Housekeeping approach and cell relocation.

Project challenges & Objectives

Collision in Dedicated Cells

- ▶ Housekeeping approach and cell relocation.
- ▶ Tx housekeeping.



Cell 1 PDR



Cell 2 PDR

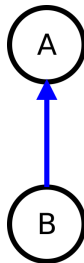


Cell 3 PDR

Project challenges & Objectives

Collision in Dedicated Cells

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0.8

Cell 1 PDR

0.8

Cell 2 PDR

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Cell 3 PDR

Project challenges & Objectives

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0.8

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0.8

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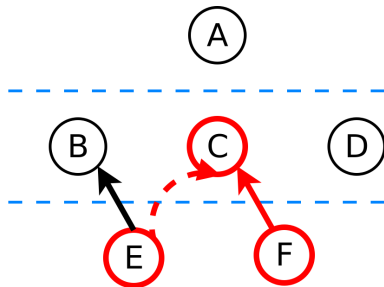
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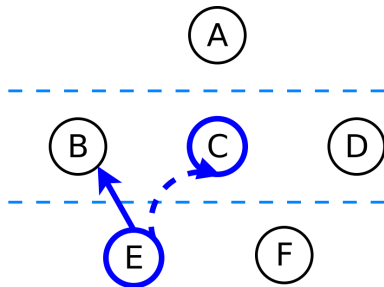
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Project challenges & Objectives

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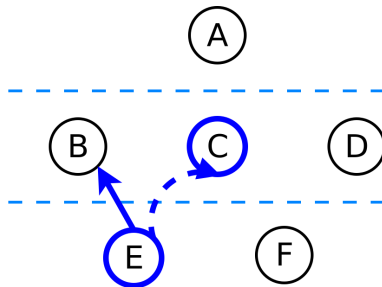
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Project challenges & Objectives

Collision in Dedicated Cells

- ▶ Housekeeping approach and cell relocation.
- ▶ Tx housekeeping.
- ▶ Rx housekeeping.
- ▶ Dealing with collisions after they occur. Good idea ?



Project Objectives

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- ▶ Creating a flexible mechanism, compatible with all scheduling functions

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