

Ey-Wifi: Active Signaling for the ns-3 802.11 Model

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I-Introduction

> What is Ey-Wifi?

Ey-Wifi is a ns-3 module integrating the features of the EY-NPMA medium access protocol for the ns3 802.11 Model.

The purpose of Ey-Wifi module is to facilitate the evaluation and the design of scenarios for EY-NPMA based wireless networks.

> What is EY-NPMA?

EY-NPMA (Elimination-Yield Non-Pre-emptive Multiple Access) is a contention based protocol that has been used as the medium access scheme in HiPERLAN type 1. EY-NPMA is based on active signaling.

> Why use EY-NPMA?

EY-NPMA advantages:

- Low collision rate.
- Efficient priority scheme to support Quality of Service (QoS).
- Small access overhead.

II- EY-NPMA medium access protocol

EY-NPMA channel access cycle comprises three phases:

> Priority phase:

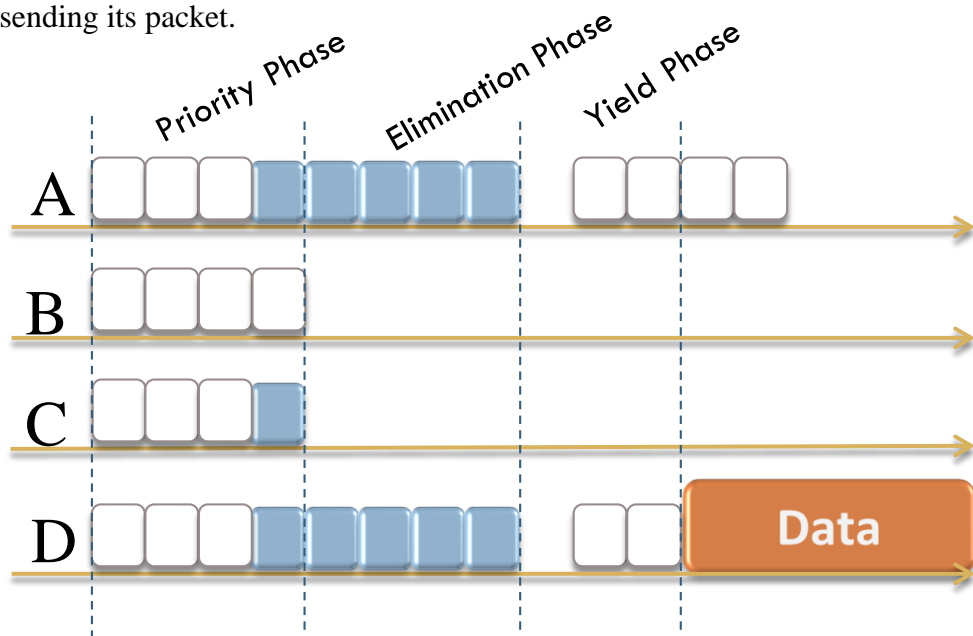
- Guarantees that only nodes whose transmission has the highest priority will survive the first phase.
- Five priorities (from 0 to 4): the shorter the lifetime of the packet, the higher the priority allocated to it is.
- During this period: a node keeps listening to the channel.
- If the channel remains idle, the node proceeds to the next phase.

> Elimination phase:

- Surviving nodes send an elimination burst of a random length (0 to 12 slots)
- After transmitting the burst, the node senses the channel.
- The nodes which send the longest elimination burst will survive and proceed to the next phase.
- The others sense an activity after their burst and quit the contention.

> Yield Phase:

- Each surviving node listens to the channel during the yield period (0 to 9 slots).
- The node having the smallest yield period is the final winner and it starts sending its packet.



III- EY-NPMA Module: Ey-Wifi for ns3

> Observation:

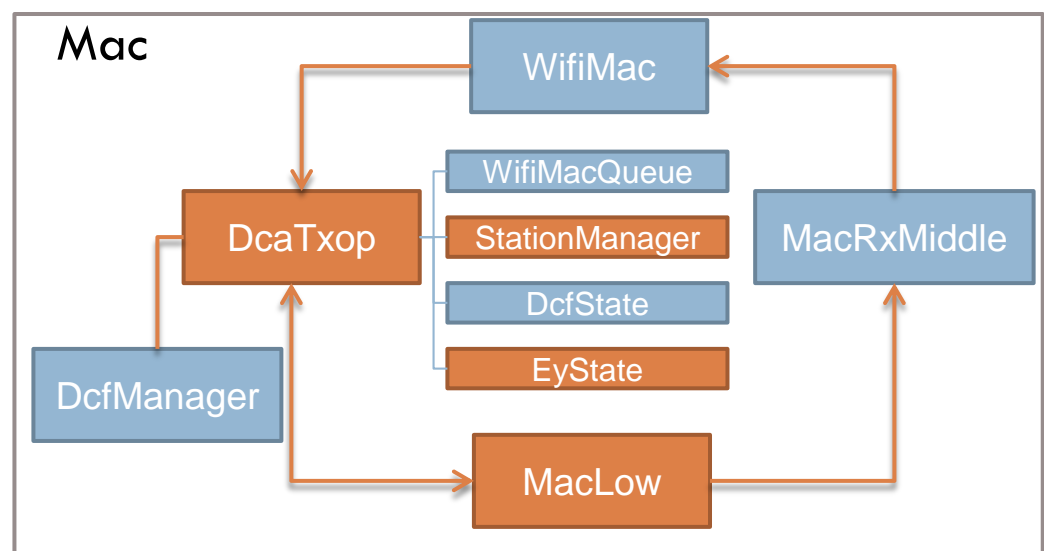
- Dcf scheme and EY-NPMA access rules have common phases.
- EY-NPMA extra phase is the elimination phase.
- ns3 wifi module already handle many of the functionalities required.

> The main idea? Extension of Dcf scheme of wifi module

- Create a new “State“ keeping track of the burst for elimination phase.
- For each packet two DcfStates are aggregated :
 - EyState to handle the burst transmission.
 - DcfState to handle data transmission.

> Operation Sequence:

- DcaTxop requests access by calling DcfManager::RequestAccess(EyState).
- RequestAccess(EyState) checks if Backoff is elapsed (like priority phase).
- MacLow handles the creation and transmission of the burst signal.
- If the burst is already sent, DcaTxop invoke RequestAccess(DcfState).



IV- Preliminary Results

> Scenario: Same scenario used to evaluate both: Wifi and Ey-Wifi

- 30 nodes disposed on a grid.
- Distance between nodes is fixed to 1 meter.
- Physical layer at 6 Mbps.
- Nodes broadcast periodically packets of 1000 bytes.

> Results: The packet rate is varied until saturation.

- Metric: aggregate number of broadcast packets received per unit time.
- At saturation the goodput of Ey-wifi is higher than wifi.

