Question 3 Pas encore répondu	With such an SDN architecture applied to WSN, explain briefly how a network control application, running on the SDN controller, in charge of increasing battery-powered nodes' life time can take advantage of the opportunities brought by the SDN paradigm ?

As I understand, the network control application's motive/objective is to help increase the battery life time of the IoT end-devices/nodes of a SD6WSN network.

The network control application can take advantage of the following advantages/features of the SD6WSN architecture,

Advantage-1

- First of all, the network application needs to learn the battery status of each of the SD6WSN nodes in the topology. This is made possible using the **info-get message** with the 'observe' option. The controller will be notified with the status on battery life time periodically.
- Using the battery-life status notifications and the unified view of the WSN topology, the network control application can help SDN controller to make a flow-control 'logic/strategy' on the basis of battery life time availability/consumption trends. This way, the network control application can act smart and help in optimal usage of battery.
- SDN controller computes the flow-table and routing table usually the conventional methods of implementing the metrics such as distance, link status etc. Now, battery life status could also be used as one of the main criteria in computing the flow table/routing table.

Advantage-2

- In the SD6WSN architecture, the 6LBR border router is a key critical component whose battery life consumption can be high compared to other nodes. The network control application could help the SDN controller in designating the 6LBR in a rotation on the basis of the battery life. This way, not one node functions as 6LBR and gets exhausted of battery.

Advantage-3

- The SD6WSN Controller acts as CoAP client and the SD6WSN nodes act as CoAP server. The topology change management is handled using **'info-get' message with 'observe' option.** Which means, that whenever there is a topology change, the controller will get updated immediately. Therefore, paging/synchronization message communication between the controller and nodes will not be required. Also, the nodes needn't be in 'reception' mode always. This can avoid the battery drain and improves the battery life time.

Advantage-4

- The SDN paradigm separates the control plane route computing and data plane packet forwarding as two separate functions. The SD6WSN nodes are not required to perform any

control plane route computing as they are performed at a centralised SDN controller. This reduces the battery energy needs drastically in a SD6WSN architecture.

- Moreover, at SD6WSN nodes, the network control application can monitor the energy consumption for tasks related
    - data plane packet forwarding, flow table manipulations
    - communication with SDN controller via SD6WSNP messages
    - Control plane RPL routing
    - Local sensing application

  The energy consumption for each task can be monitored and the info can be used to battery energy optimization at individual node level.