ORCA

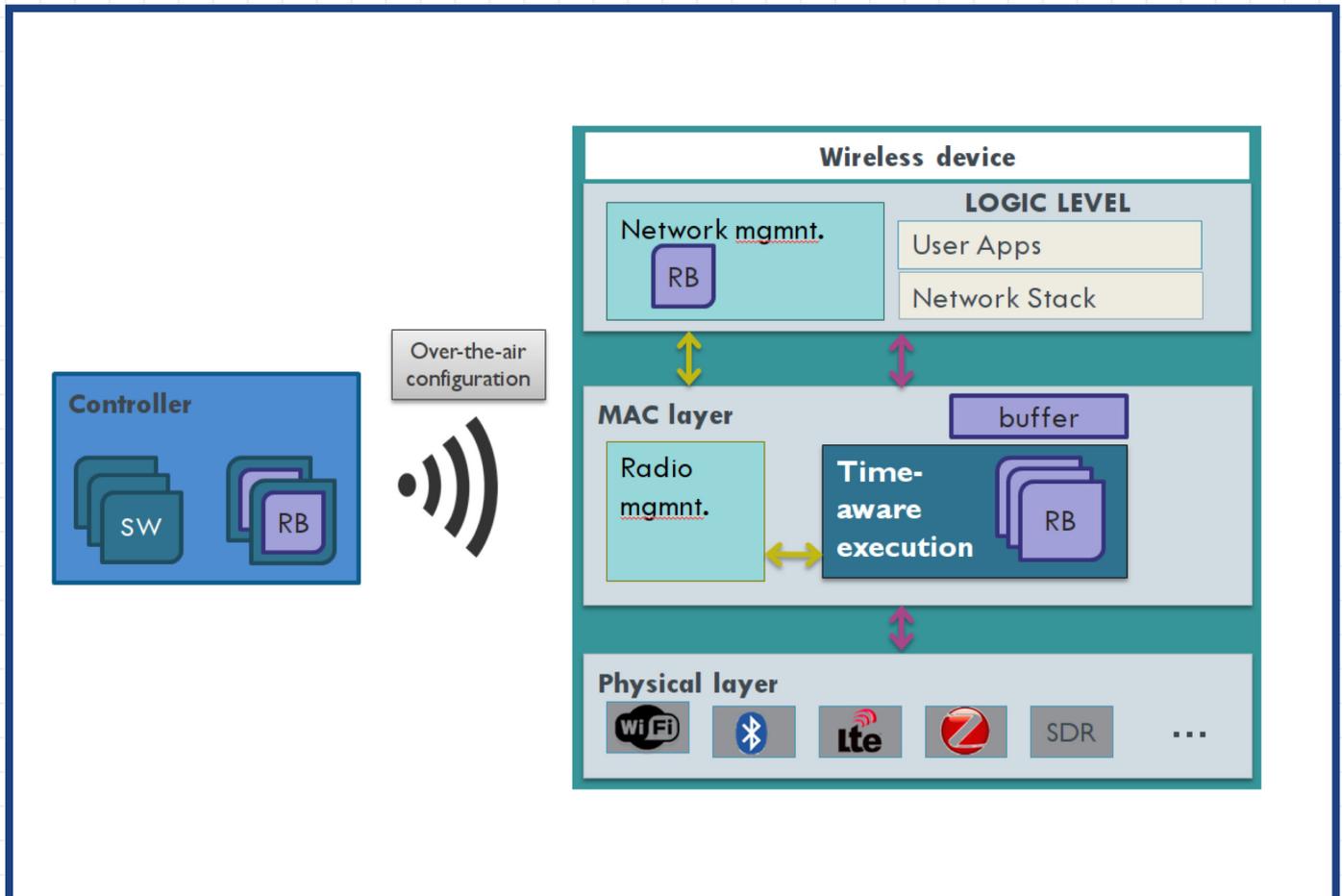**Orchestration and Reconfiguration Control Architecture**

BASIC SDR CONTROL PLANE FUNCTIONALITY

Build SDR control plane:
Runtime switching between MACs

A central controller makes the decision to switch between the different MAC protocols installed on the device.

If a new MAC protocol needs to be installed, the controller controller transmits the new radio binary (RB) containing the protocol. This new RB is than injected into the MAC layer, where it is stored next to the already installed protocols.

CONTEXT

Typically, MAC protocols are deployed for the lifetime of a device. The choice of the employed protocol is of high importance, since it cannot be changed after deployment. There are several reasons why one might rethink the initial selection: highly dynamic application requirements, varying environmental factors, security updates, bug fixes, etc. Typical network stacks do not allow for such deep changes in protocol behaviour. There is a need for switching between pre-installed MAC protocols (to the most optimal one based on all varying conditions). This will allow for a higher level of flexibility to handle changing application requirements and dynamic network environments. An intelligent central control entity will make the final decision to switch to a new protocol. The change needs to be timely enforced on all nodes, to keep the network in a coherent state.

UNIQUE SELLING POINT

- The framework will allow switching intelligently between several pre-installed MAC protocols based on monitoring statistics.

- While switching between the different MAC protocols, the state of the previous protocol will be saved. The configuration of the new protocol will be loaded, and the physical layer will be re-initialised. Thus, the transition back and forth between different MACs will be possible in real time without the need for bootstrapping the MAC on nodes after each transition.

OPPORTUNITIES

- This offer will allow for a high level of flexibility in terms of MAC protocol usage, as a protocol can be interchanged easily by another one.

- This offer will support for an intelligent entity to take a central decision to switch the MAC protocol. Users can implement their own logic for the switching, as well as provide a protocol that needs to be spread across the different devices inside the network.

REFERENCES

Following git repositories consist of the Contiki tree, and the existing MAC creation framework (TAISC):

- TAISC is free of charge for academic usage, for more information please refer to [1] and http://www.wishful-project.eu/taisc

1 Jooris, B., Bauwens, J., Ruckebusch, P., De Valck, P., Van Praet, C., Moerman, I., & De Poorter, E. (2016). TAISC: A cross-platform MAC protocol compiler and execution engine. Computer Networks, 107, 315-326.