Intelligent system within wireless sensor and actuator networks: reconfigurable node platform

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Abstract - In this paper the reconfigurable platform for wireless nodes within wireless intelligent system is described.

Keywords – Intelligent System, WSN, WPAN, WBAN, SDR.

I. INTRODUCTION

Proposed is the intelligent system for wireless networks without stable infrastructure. Elements of such system support firmware and software reconfiguration. Intelligent system includes the network, the methods, techniques and stepping-stones for its forming and reconfiguration. It includes specific hardware platform for wireless nodes, its architecture and nodes operating algorithms.

II. INTELLIGENT SYSTEM CONCEPTS

The concepts of intellectual behavior and functional flexibility are distinguished on two layers. On the system layer it means fast network startup, minimized power consumption, security. On the device level it assumes optimal routing strategy, switching to other radio-interface etc.

The target characteristics of the entire network can be changed on the fly. This may be as a result of internal node decision or network administrator action. New behavior model is to be diffused through the network. The source of new behavior model can be node itself. The “Simple” and “Extended” nodes are rather initiators of such changes while the “Super” node is a source of updated behavior model. So, the network, or its part can be switched from “Fast” to “Protected” operation mode when intrusion is detected. After the invader is reported and deactivated, the network continues to operate in normal mode which is “Fast” in this case.

TABLE 1

<table>
<thead>
<tr>
<th>Node Type</th>
<th>Peripherals</th>
<th>Radio Interfaces</th>
<th>Behavior Controllers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Extended</td>
<td>1 ≥1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Super</td>
<td>≥1 ≥1</td>
<td></td>
<td>≥1</td>
</tr>
</tbody>
</table>

III. IMPROVEMENTS

Nodes should implement pseudo-SDR functionality. That is it should support multiple radio interfaces. In the future advances in the area of Software-Defined Radio will allow multiple radio-modules eliminating and will significantly broaden the count of supported radio-interfaces (Fig.2).

III. CONCLUSION

The goal is to provide multipurpose solution which principles may be suitable for WSN, WBAN, as well as for different kinds of Wireless Ad-Hoc networks.

REFERENCES
