IDRA: a novel protocol architecture for networked embedded devices

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I. INTRODUCTION

An increasing amount of every-day objects are equipped with (wireless) communication technologies, from wireless media centers to cheap embedded sensor devices. Connectivity between these devices enables new marketable applications such as wireless industrial process control, wireless building automation, medical monitoring, disaster intervention and automated asset tracking. However, due to cost restrictions, ultra-low-cost embedded devices do not have enough processing power and/or memory to implement a complex IP protocol stack.
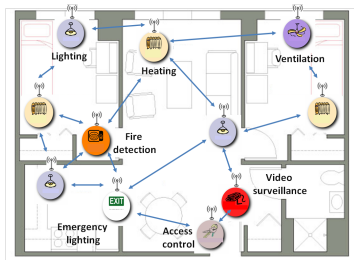

Figure 1. In a wireless building automation application, embedded devices automatically connect to each other to regulate household functions.

II. ENABLING NEXT-GENERATION APPLICATIONS

Our IDRA protocol architecture [1], [2] is designed specifically to cope with these resource-constrained devices and their networking challenges:

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- **Reduced hardware cost**. The IDRA communication stack requires only 27kB ROM and 3kB RAM.
- **High performance and a low energy footprint**. IDRA reduces the energy consumption by combining multiple information exchanges into a single packet. In addition, IDRA has in-built provisions for quality-of-service.
- **Backwards compatible**. Legacy protocols are selected automatically when communication with legacy devices is required.
- **Intelligent protocol selection**. Based on the application requirements, an intelligent service selector dynamically activates the most appropriate network protocols from those available on each device.
- **Always-best-connected**. When communicating, the optimal packet format, network protocols and communication interface are automatically selected based on the cost and/or performance preferences of the IDRA user.

A. Conclusions

IDRA allows the development of networked next-generation applications on embedded (sensor) devices. The architecture is available as an open-source communication architecture [3], either under the GPLv2 license or under custom commercial license.

REFERENCES

[1] E. De Poorter & I. Moerman, *IDRA patent application (US 12/817.722)*, June 17, 2010.
[2] E. De Poorter et al, *An information driven sensornet architecture*, 3rd Int. Conference On Sensor Technologies and Applications., June 2009.
[3] IDRA open-source, http://idraproject.net.