A SystemC-centric Approach for Simulation and Generation of WSN Applications Targeted to ZigBee

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Wireless Sensor Network Application Issues

- WSN application developed without any support from system software
  - “O.S + device drivers + libraries + WSN application” as a monolithic procedure
- Non-trivial development of WSN applications
  - Ad-hoc applications
  - No flexible and scalable
- High development costs
A novel approach for the development of WSN applications (ZigBee-based)

- Introduction of a novel approach: **Middleware-centric**

A SystemC framework for WSN applications Design, Simulation and Refinement

Abstracts common programming paradigms

Networked Embedded System Application (WSN)

Abstract Middleware Environment

SystemC code

SystemC code

SystemC code

Simulation and Validation Environment

ZigBee Service Description & Target platform execution model

Automatic Mapping

Simulated environment

Real environment

ZigBee-based application over the target platform (Texas Instruments' ZigBee Development Kit)
AME Object-oriented to Z-Stack (ZigBee) mapping process

AME Application (C++)

init() {
    ... 
    if (COORDINATOR)
        registerobj(object)
    else
        ref = lookup(object)
    ... 
}

run() {
    ... 
    ref->method1(par1, ..., parN)
    ref->method2(par1, ..., parN)
    ... 
}

class object {
    ...
    method1(par1, ..., parN) {
        ...
    }
    method2(par1, ..., parN) {
        ...
    }
    ...
}

/* AME OOM Services */
lookup(...) {...}
registerobj(...) {...}

AME2zigbee Intermediate Application (C)

/* ZigBee OOM Services */
lookup(...) {...}
registerobj(...) {...}
invoke(...) {...}