Enabling SNMP for IEEE 802.15.4 A Practical Architecture

Cristian M. VANCEA, Virgil DOBROTA

Technical University of Cluj Napoca, Communications Department

26 Baritiu Street, 400027, Cluj-Napoca, Romania

E-mail: : {Mihai.Vancea, Virgil.Dobrota}@com.utcluj.ro

SCHEME OF TALK

- INTRODUCTION
- SYSTEM'S ARHITECTURE
- IEEE 802.15.4 MIB
- EXPERIMENTAL RESULTS
- CONCLUSIONS
- FUTURE WORK

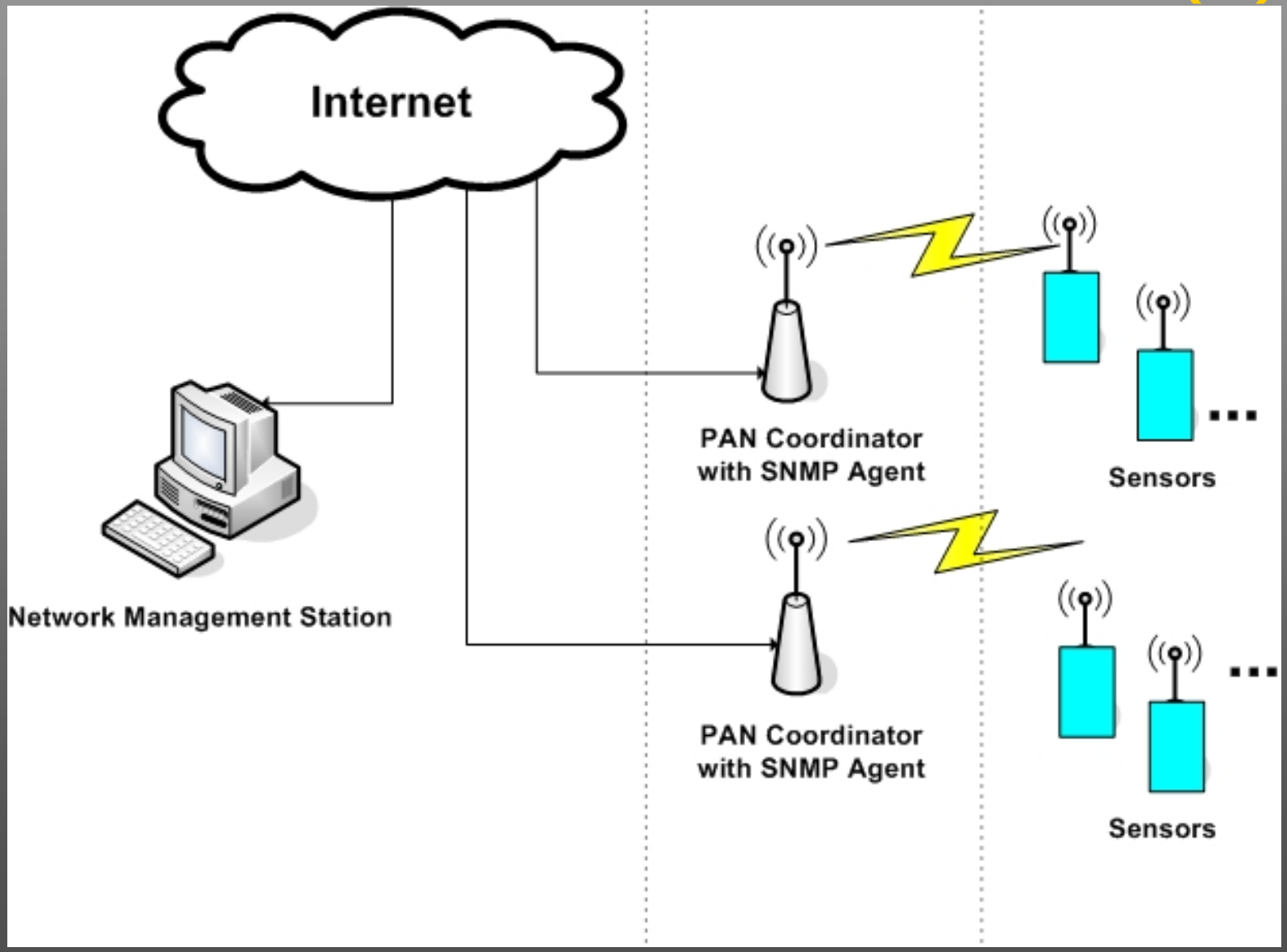
INTRODUCTION

- IEEE 802.15.4 was developed to address low-cost, low-complexity and low-power design
- Low data rate wireless connectivity
- Fixed, portable, and moving devices with very limited battery capacity
- SNMP framework - management of equipment implementing TCP/IP stack
- It seems that adding SNMP to devices implementing IEEE 802.15.4 is not quite suited

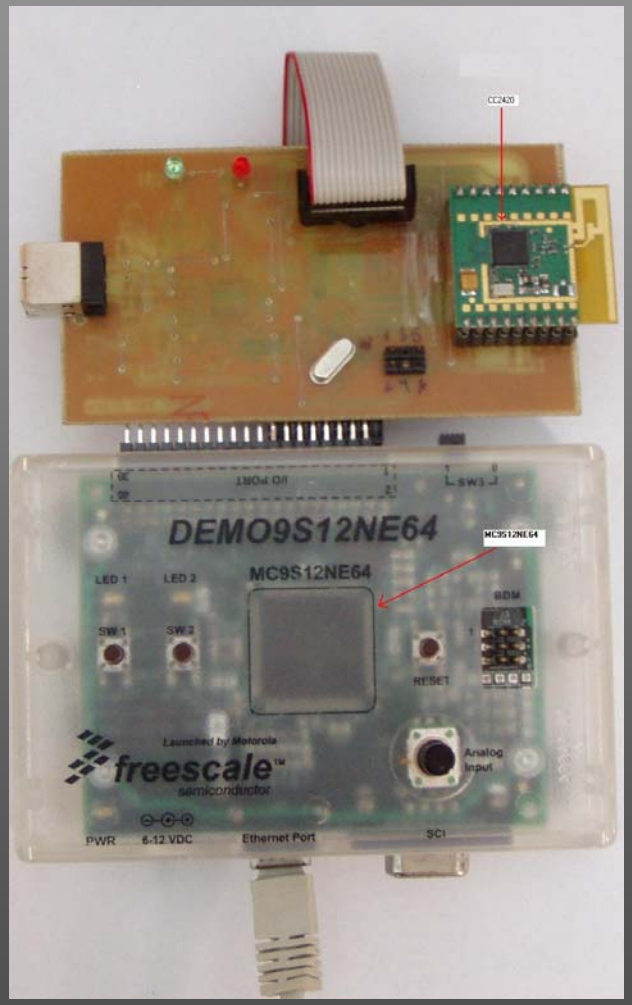
SYSTEM'S ARHITECTURE(1)

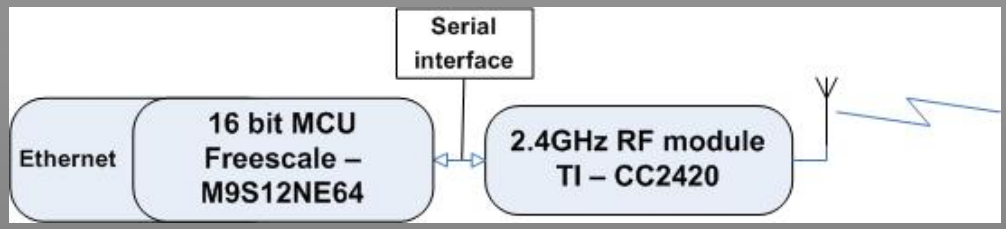
- SNMP Framework
  - NMS (Network Management Station)
  - Managed nodes - agents
  - Management information
  - MIB (Management Information Base)
- IEEE 802.15.4 Framework
  - RFD (Reduced-Function Device)
  - FFD (Full-Function Device)
  - one FFD -> PAN coordinator

SYSTEM'S ARHITECTURE(2)



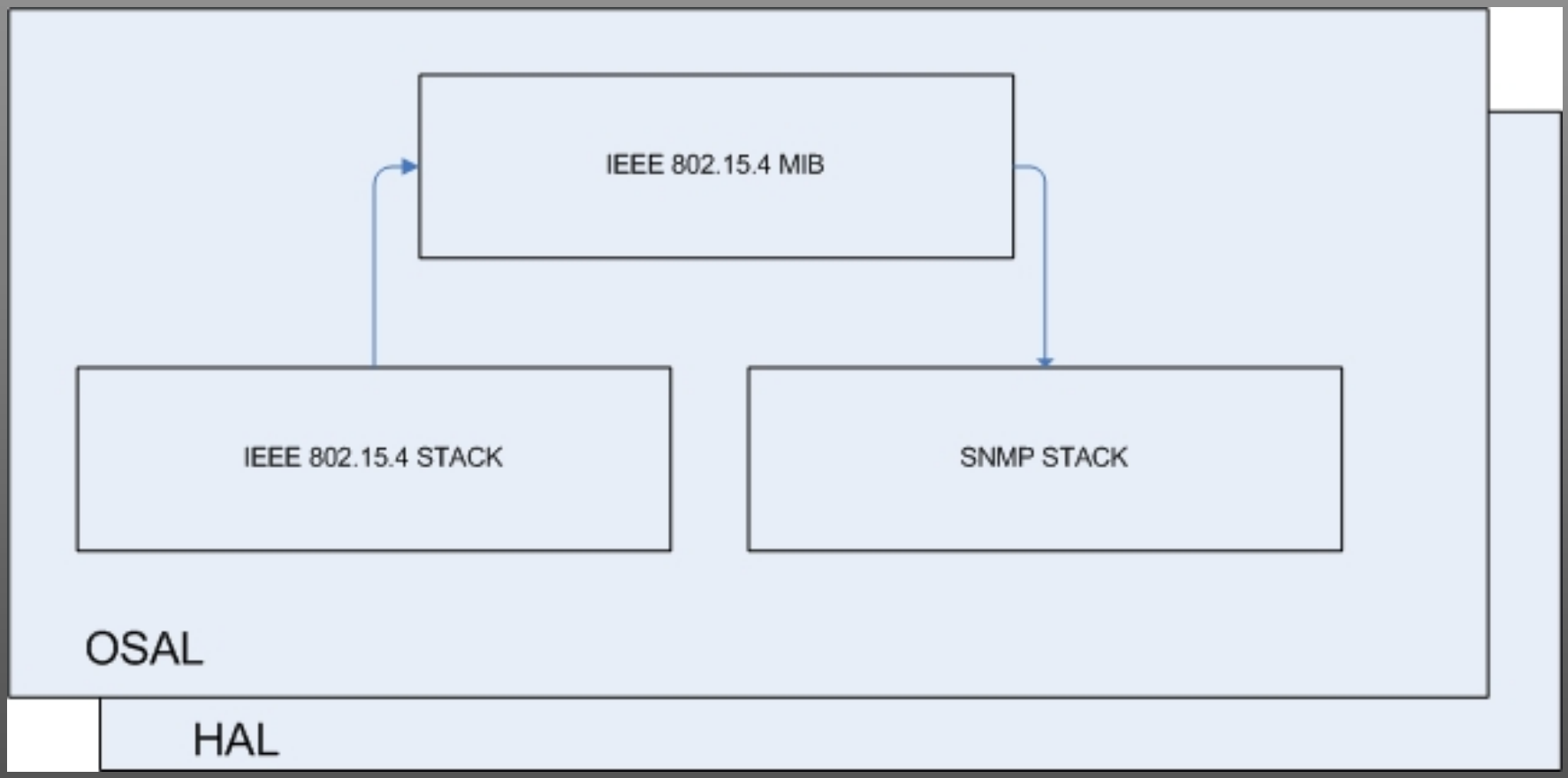
SYSTEM'S ARHITECTURE(3)



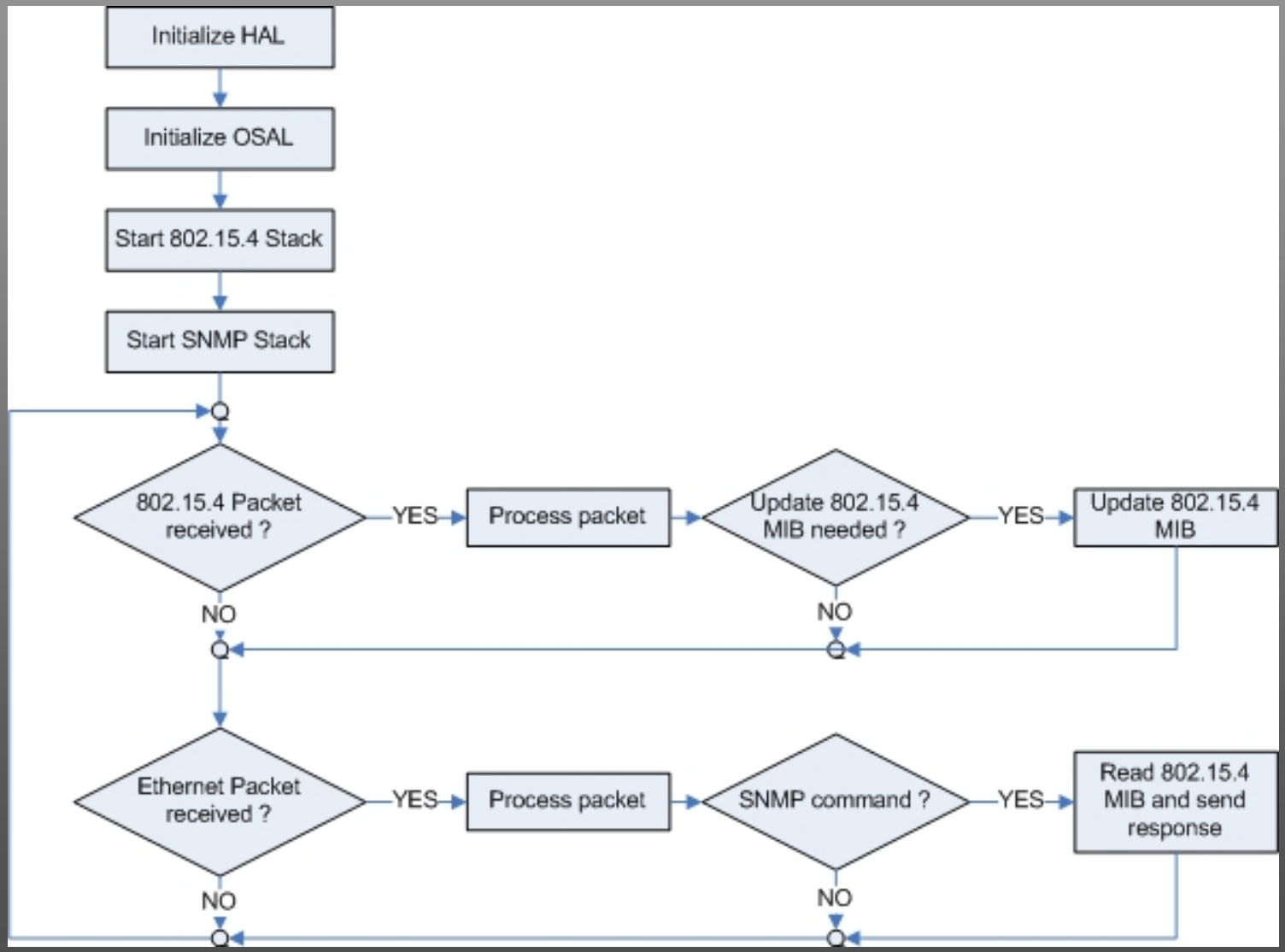


- MCU - M9S12NE64 (Freescale)
  - 100BASE-TX – 100 Mbps
- RF - CC2420 (Texas Instrument)
  - 2.4 GHz band
  - 250 kbps wireless data rate

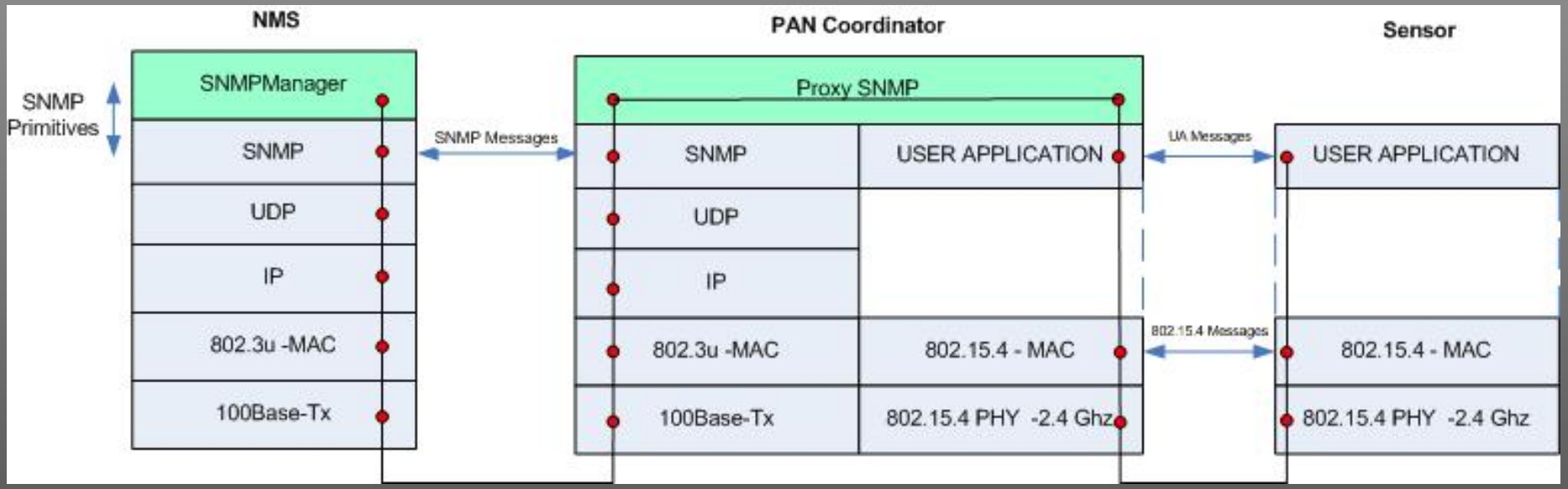
SYSTEM'S ARHITECTURE(4)



SYSTEM'S ARHITECTURE(5)



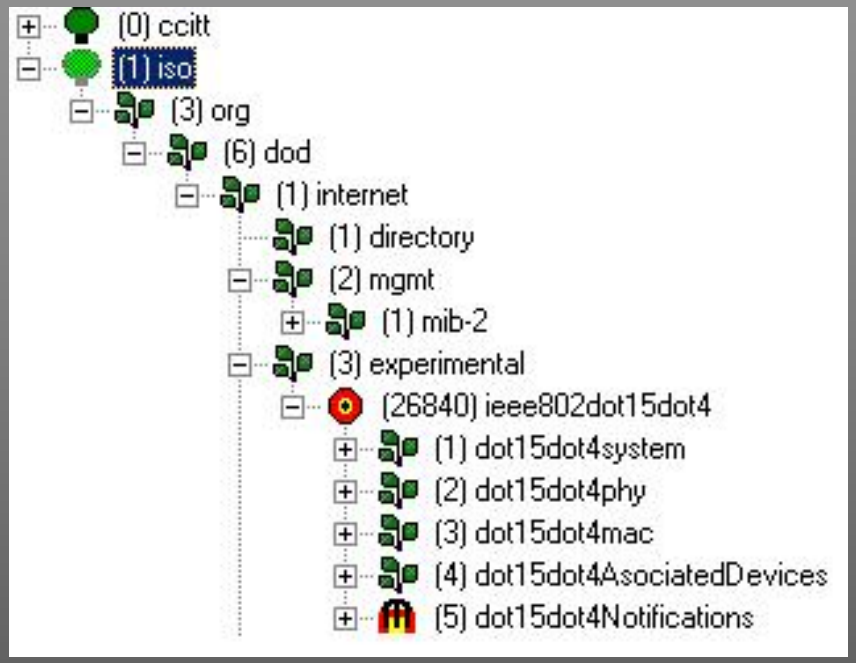
SYSTEM'S ARHITECTURE(6)

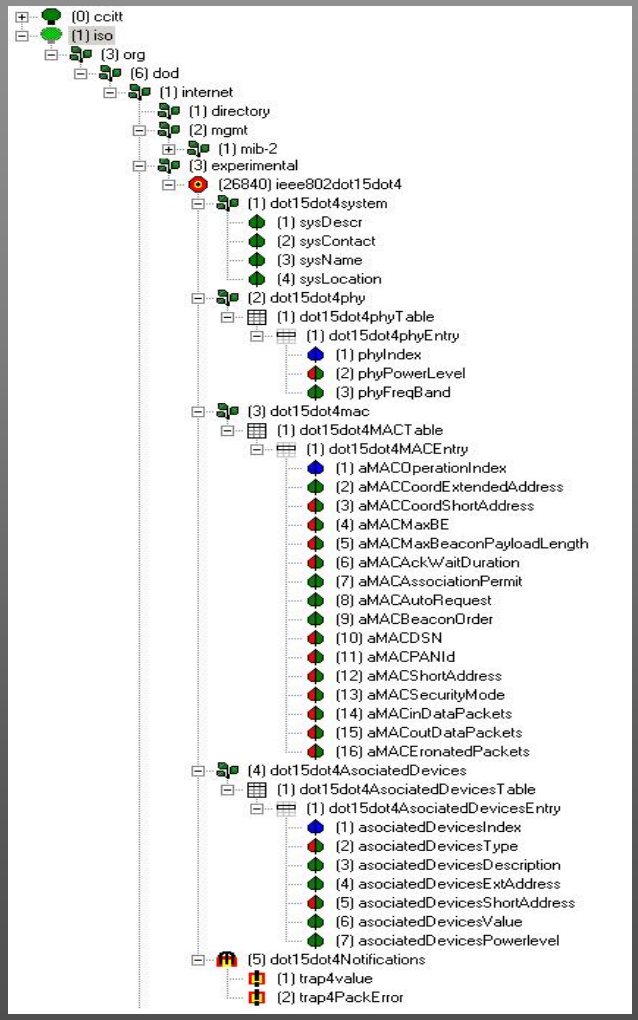


IEEE 802.15.4 MIB(1)

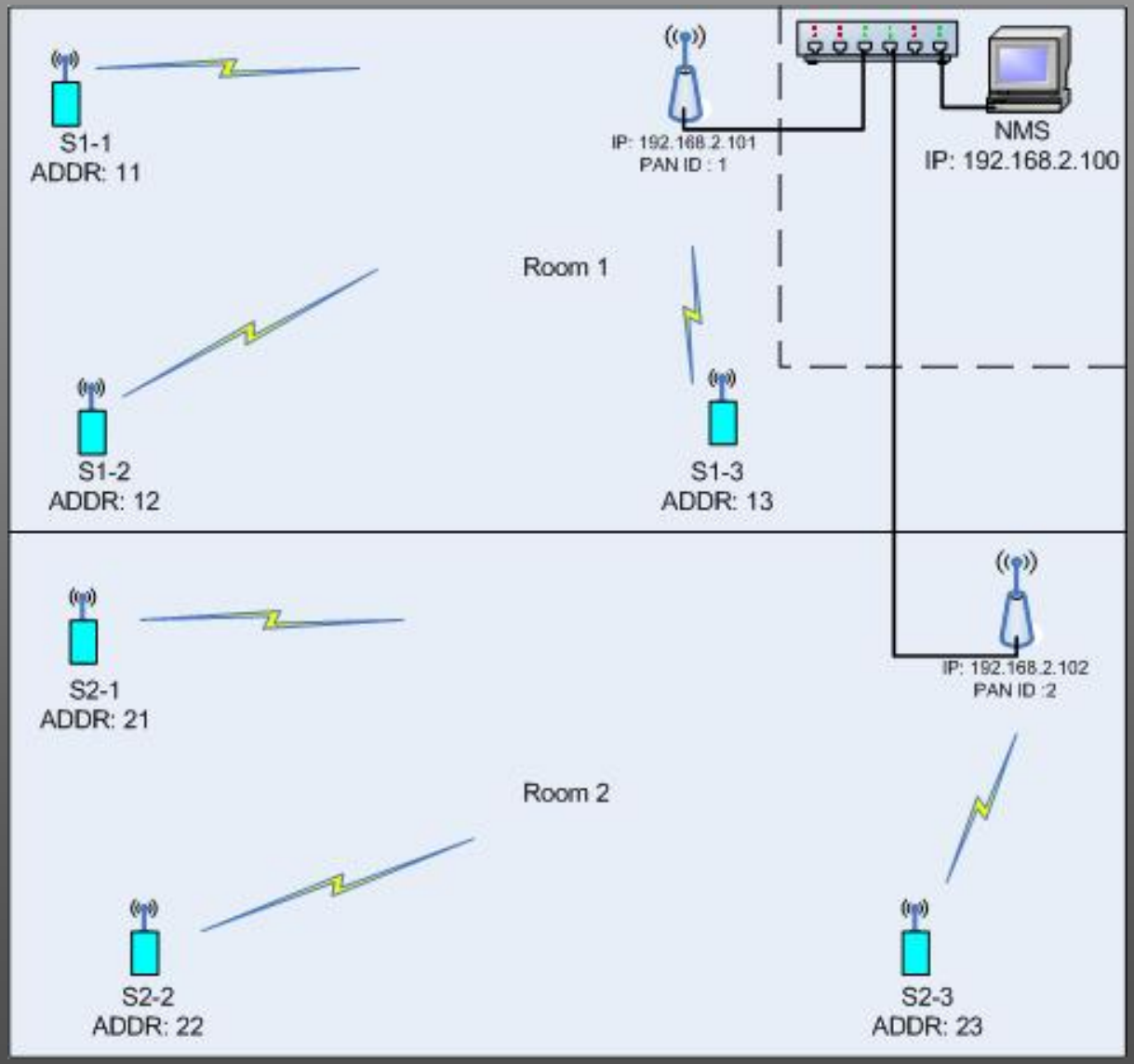
- Virtual information store
- Written using a subset of ASN.1
- SMIv2
- Has five sections :
  - dot15dot4system
  - dot15dot4phy
  - dot15dot4mac
  - dot15dot4AsociatedDevices
  - dot15dot4Notifications

IEEE 802.15.4 MIB(2)

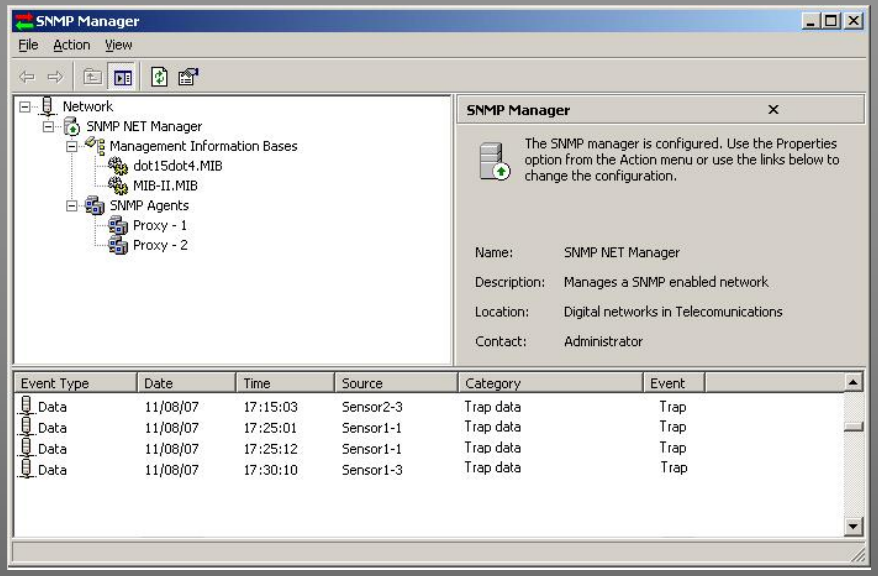


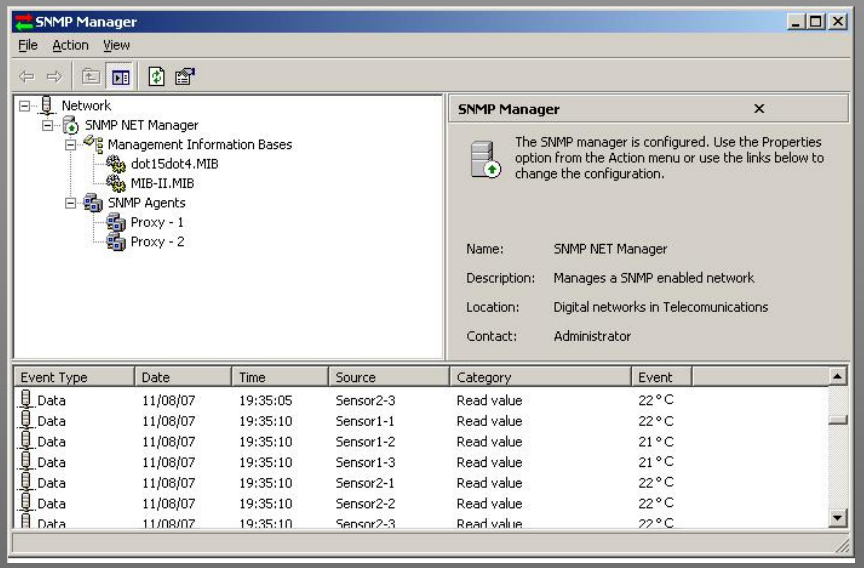


EXPERIMENTAL RESULTS(1)



EXPERIMENTAL RESULTS(2)





- 2 types of experiments
- First experiment - generating and receiving traps
- Second experiment - monitoring the temperature of sensors

CONCLUSIONS

- SNMP management for IEEE 802.15.4 devices - a feasible solution
- Using appropriate hardware and software equipment - easy integration into management system

FUTURE WORK

- Extend the defined MIB - ZigBee
- Improving security for data transfer – SNMPv3
- Implementing SNMP into wireless sensors–IPv6
- Change current OS to RTOS – improve performances

THANK YOU

QUESTIONS?