



# Resource Management of Heterogeneous Wireless Sensor Networks

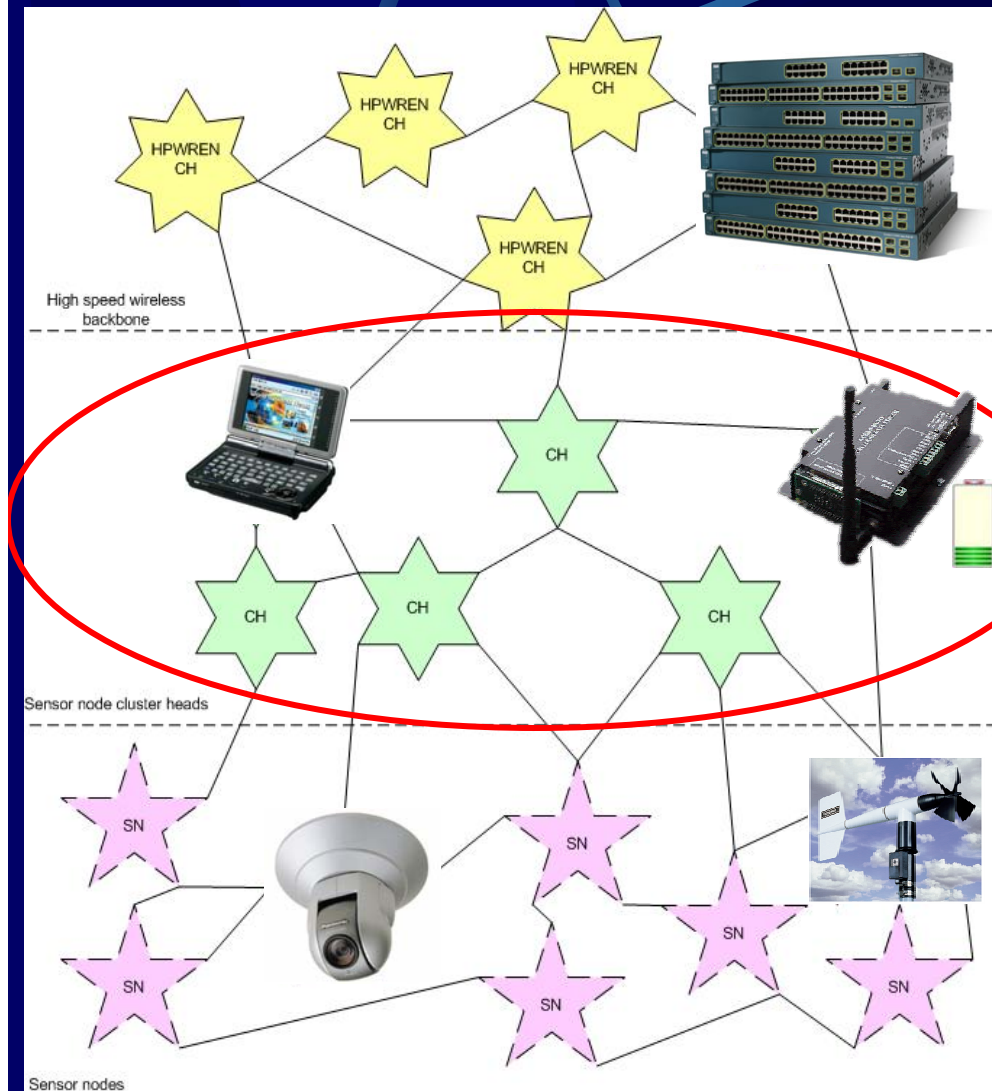
Tajana Šimunić Rosing  
Edoardo Regini, Gaurav Dhiman

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Sun Microsystems, HP, Qualcomm

# Heterogeneous Wireless Sensor Network



# HPWREN - three tier network



## Wireless MESH

- QoS routing
- Fast wireless connectivity

## Sensor Cluster Heads

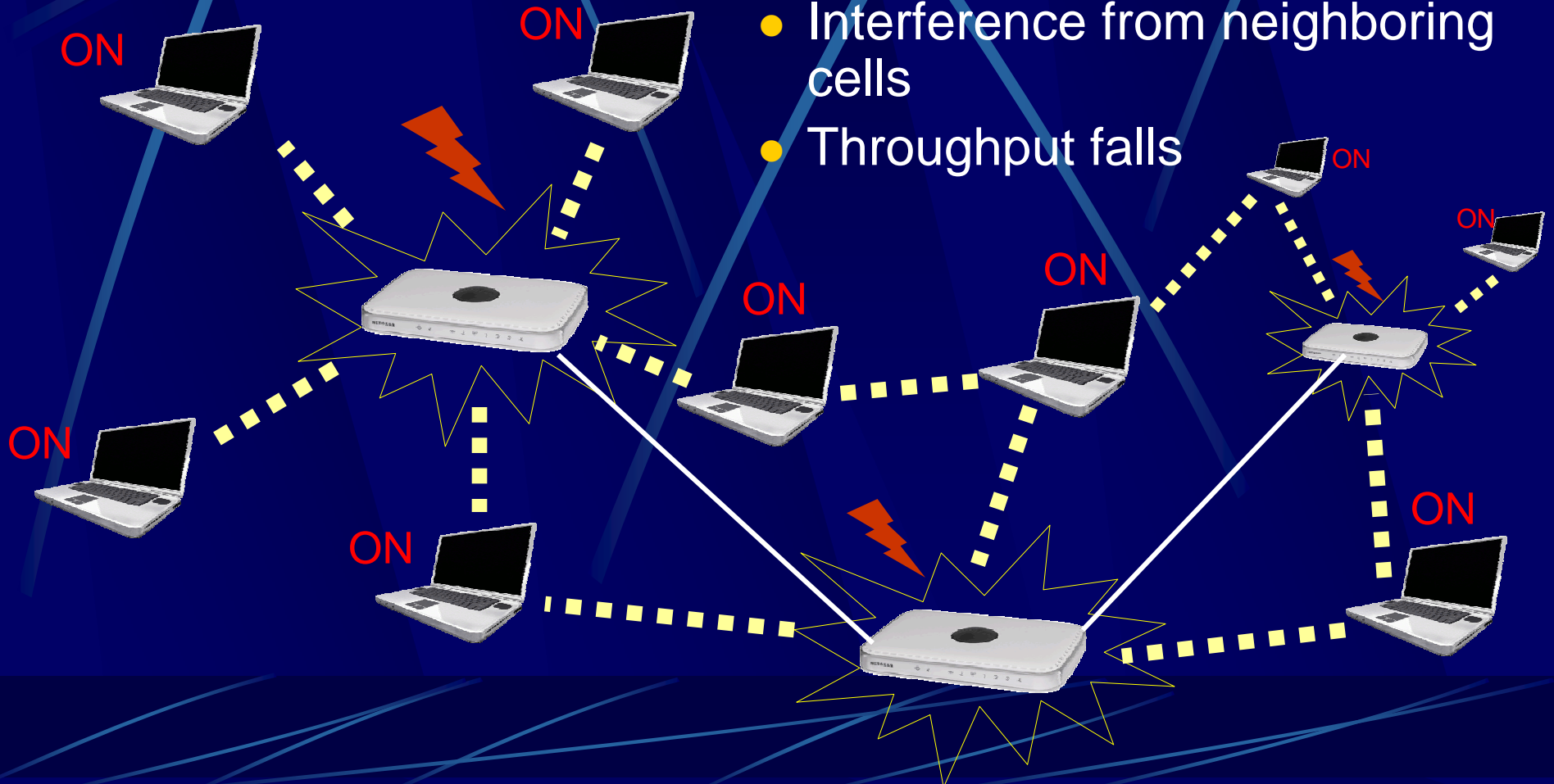
- Key issue:
  - Delivering good QoS
  - With long battery lifetime
- Use faster radio to support QoS requirements

## Sensor Network

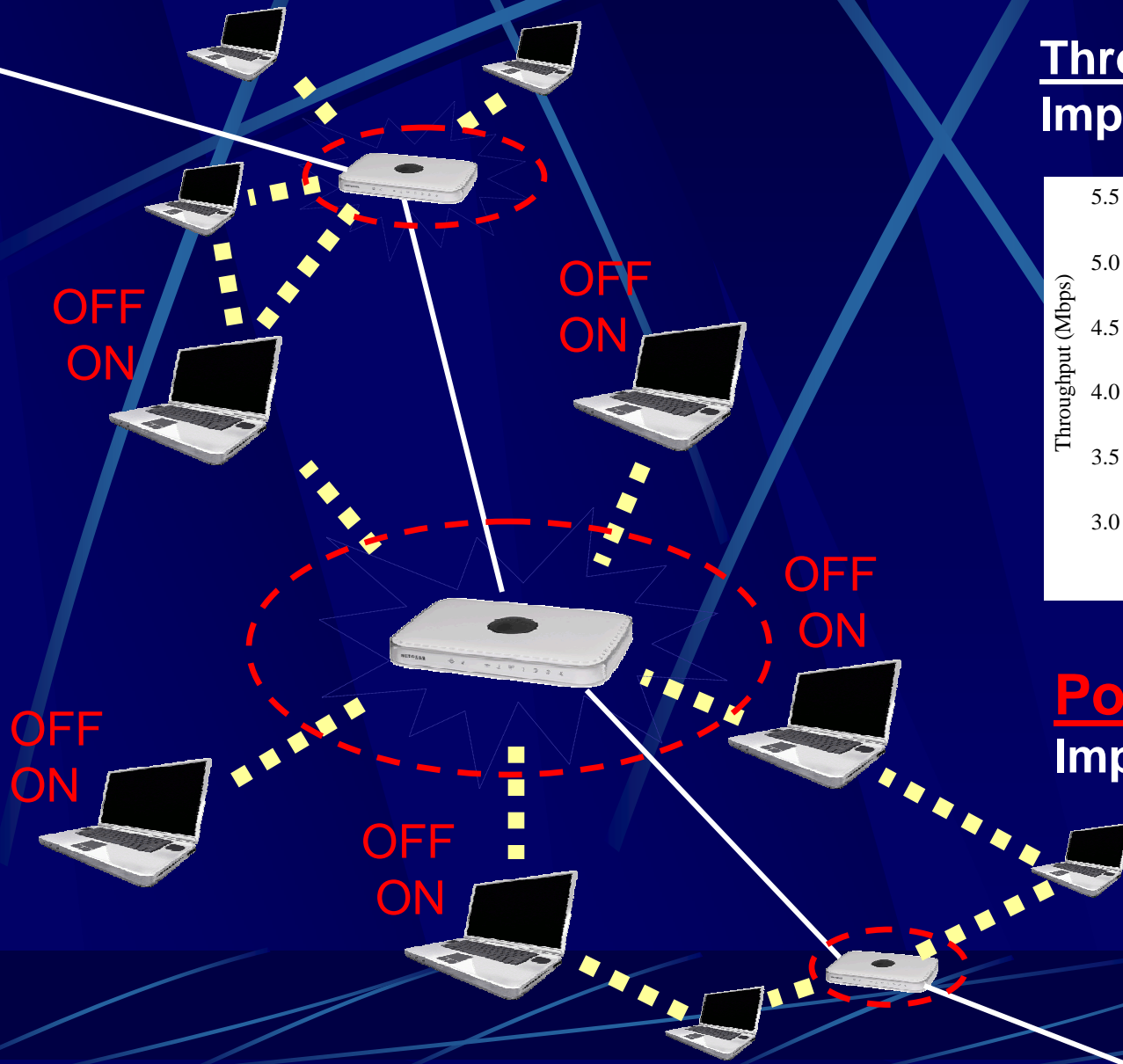
- QoS
  - not considered in traditional sensor net research
- Battery lifetime

# Contention and Interference

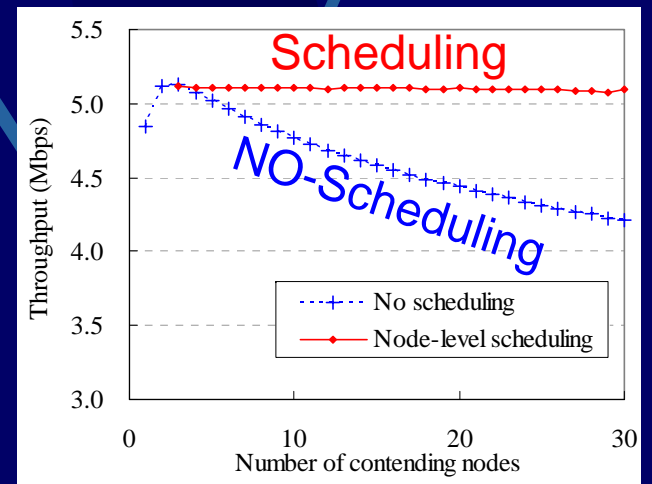
- Many packet collisions
- A lot of time spend in packet retransmissions
- Interference from neighboring cells
- Throughput falls



# Solution: Scheduling



**Throughput:**  
Improvement up to 10%

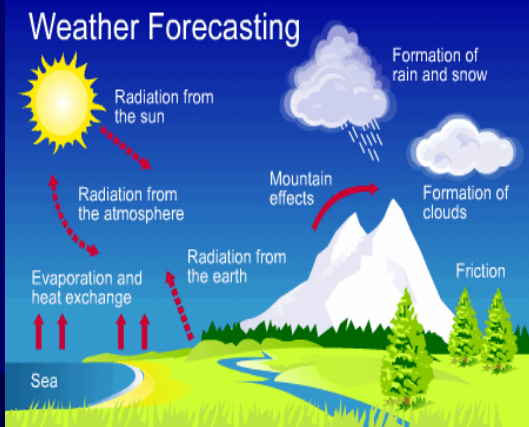


**Power :**  
Improvement up to 85%

# Routing



Router resources  
shared equally by all  
sources



# QoS Routing

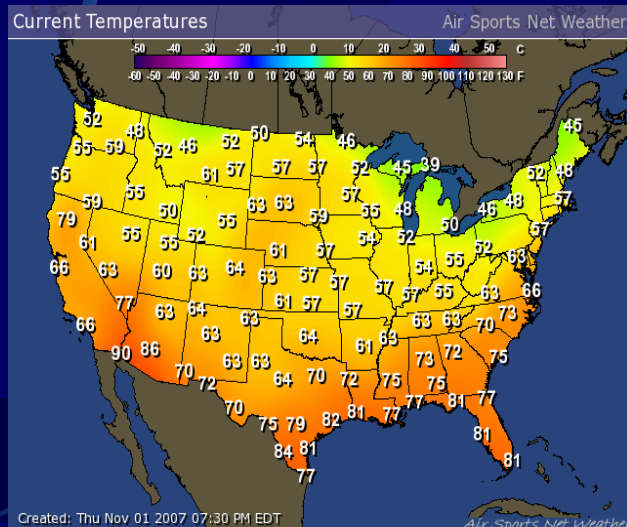
Quality of Service: guaranteeing router resources to a data flow in accordance with its priority  
High Priority



Priority Bulk

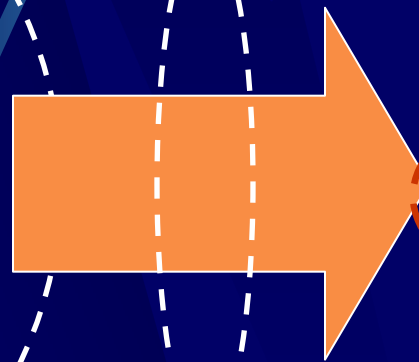


Standard



# QoS Guarantees

- Router Configuration for QoS
- Successful configuration and experimentation with Cisco 3560 for QoS  
<http://npwren.ucsd.edu/QoS/20070715.html>



Priority Bulk  
(40%)

High Priority  
(20%)

Standard  
(40%)



# Conclusion

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- Heterogeneous wireless sensor networks
  - Low power operation at lower layers
  - Require good QoS for some applications
  - Best effort traffic for the rest of the data
- Our solution:
  - Distributed, adaptive and low power QoS scheduling at lower layer
  - QoS aware routing at upper layer