

Low Power Wireless PAN Applications



LIM Lab meeting, Jaist/Japan, Oct.03 2012

By Minh-Son Nguyen, PhD.

Wireless Embedded Internet group

<http://sites.google.com/site/quanletrung/>

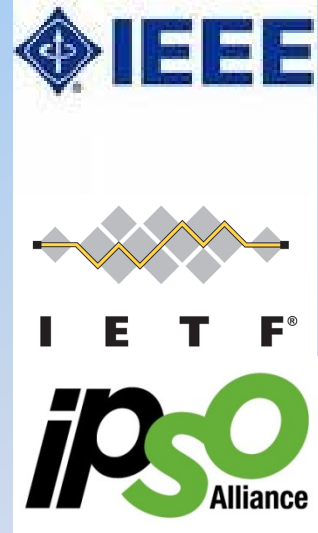
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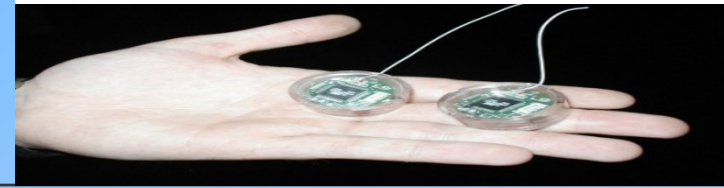
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- Re-Design and Re-Implement Low Cost Sensor Devices
- Discussions



Internet of Things

Ref: Dr. Jonathan Hui – Arch Rock – IPSO



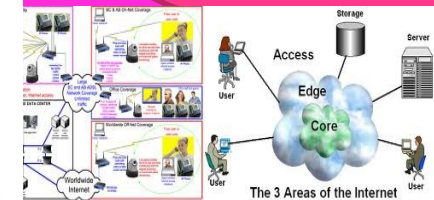
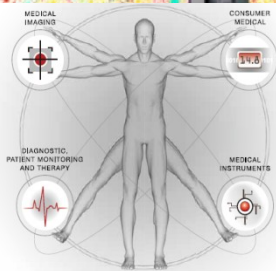
Internet of Things (Trillion nodes)

Fringe Internet (Billion nodes)

Core Internet (Million nodes)

➤ **Building automation**
 ➤ **Personal sensor**
 ➤ **Transportation/Logistics**
 ➤ **Industrial automation**
 ➤ **Smart metering/Phones**

IP-Enabled Sensor



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Internet of Things

- Variety of wireless technologies to support for daily life applications
 - RFID/802.15.4-ZigBee/802.15.1-Bluetooth/etc
- Embedded systems/services on the end-devices
 - Approach to all-IP networks
 - WHY?
 - Higher capacity for end-device at reasonable cost
 - Improvement on the implementation of TCP/IP protocol suite for scarce-resourced devices, e.g.,
 - uIP/uIPv6/lwIP/etc



Internet of Things

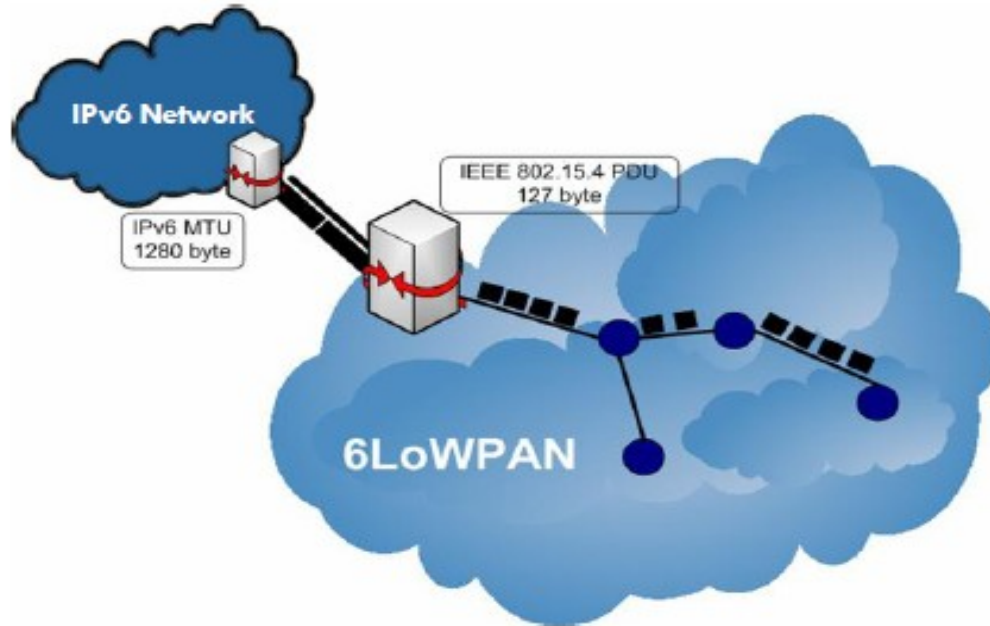
- Variety of wireless technologies to support for daily life applications
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 - **6LoWPAN as the middle layer [IP<->802.15.4 MAC] for low power control**

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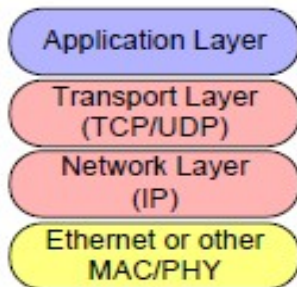
Internet of Things

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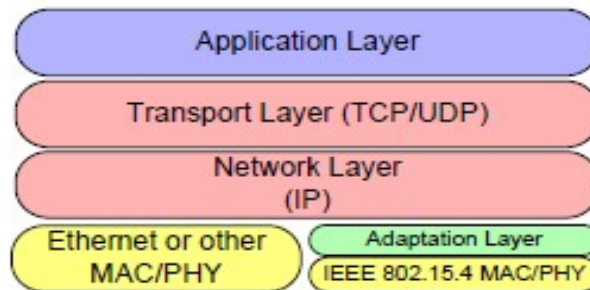


C. S. Hong, “6LoWPAN (IPv6 based Low Power WPAN),”, 2007.

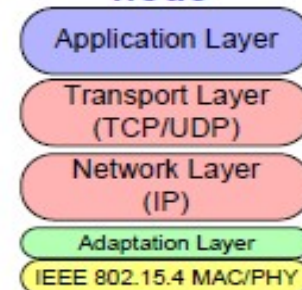
Host of IP network



Gateway (Dual stack)



6LoWPAN Sensor node



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About 6LoWPAN...

Ref: IETF – IPSO – IEEE – CISCO – ARCH ROCK

➤ Contributors to 6LoWPAN?

- ❖ Arch Rock Cop., Cisco
- ❖ IETF
- ❖ IPSO Alliance
- ❖ Berkeley (David E. Culler)
- ❖ Other: Italia, Korea, US...

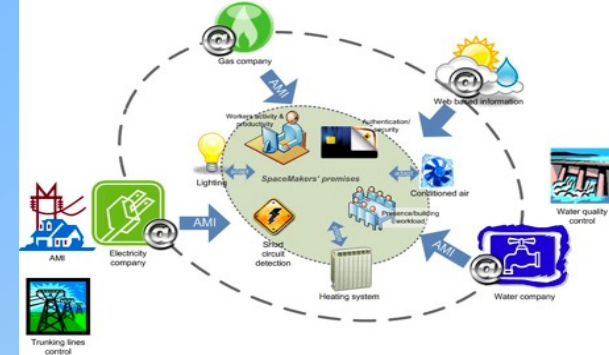


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About 6LoWPAN...

- *6LoWPAN has a broad range of applications*
 - ❖ *Facility, Building and Home Automation*
 - ❖ *Personal Sports & Entertainment*
 - ❖ *Healthcare and Wellbeing*
 - ❖ *Asset Management*
 - ❖ *Advanced Metering Infrastructures*
 - ❖ *Environmental Monitoring*
 - ❖ *Security and Safety*
 - ❖ *Industrial Automation*



patient
monitoring

fitness
monitoring



**PERSONAL
HEALTH CARE**



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About 6LoWPAN...

➤ *General problems*

❖ *Very scared-resource sensor devices*

✓ *Low power, low bandwidth, etc*

❖ *Transmission*

✓ *Reliability*

✓ *Synchronization*

❖ *Architecture*

✓ *More dynamic topology*

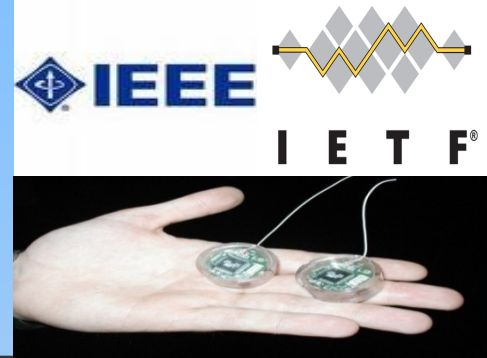
➤ *Our problems*

❖ *Cost of sensor devices & deployment of sensor systems*

❖ *Closed platforms for development*

Re-Design and Re-Implement Low Cost Sensor Devices

<http://sites.google.com/site/quanletrung/>



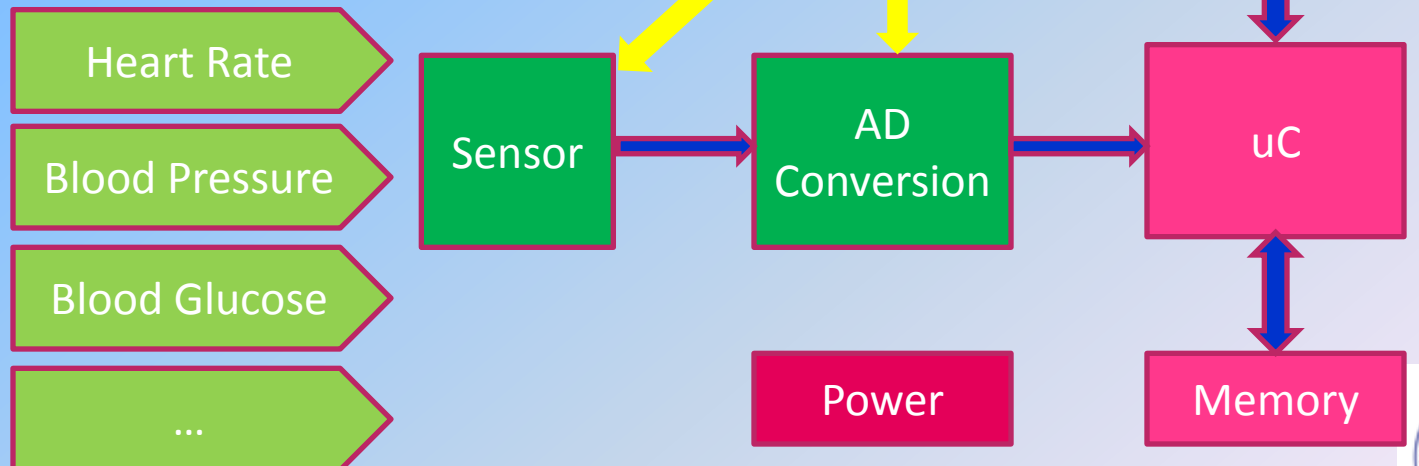
➤ *eHealthCare: Low power, Low cost*

❖ *TelosB*

✓ *Market cost: 100\$/unit*

✓ *Link to tinyos.net*

❖ *Re-Design Sensor devices*



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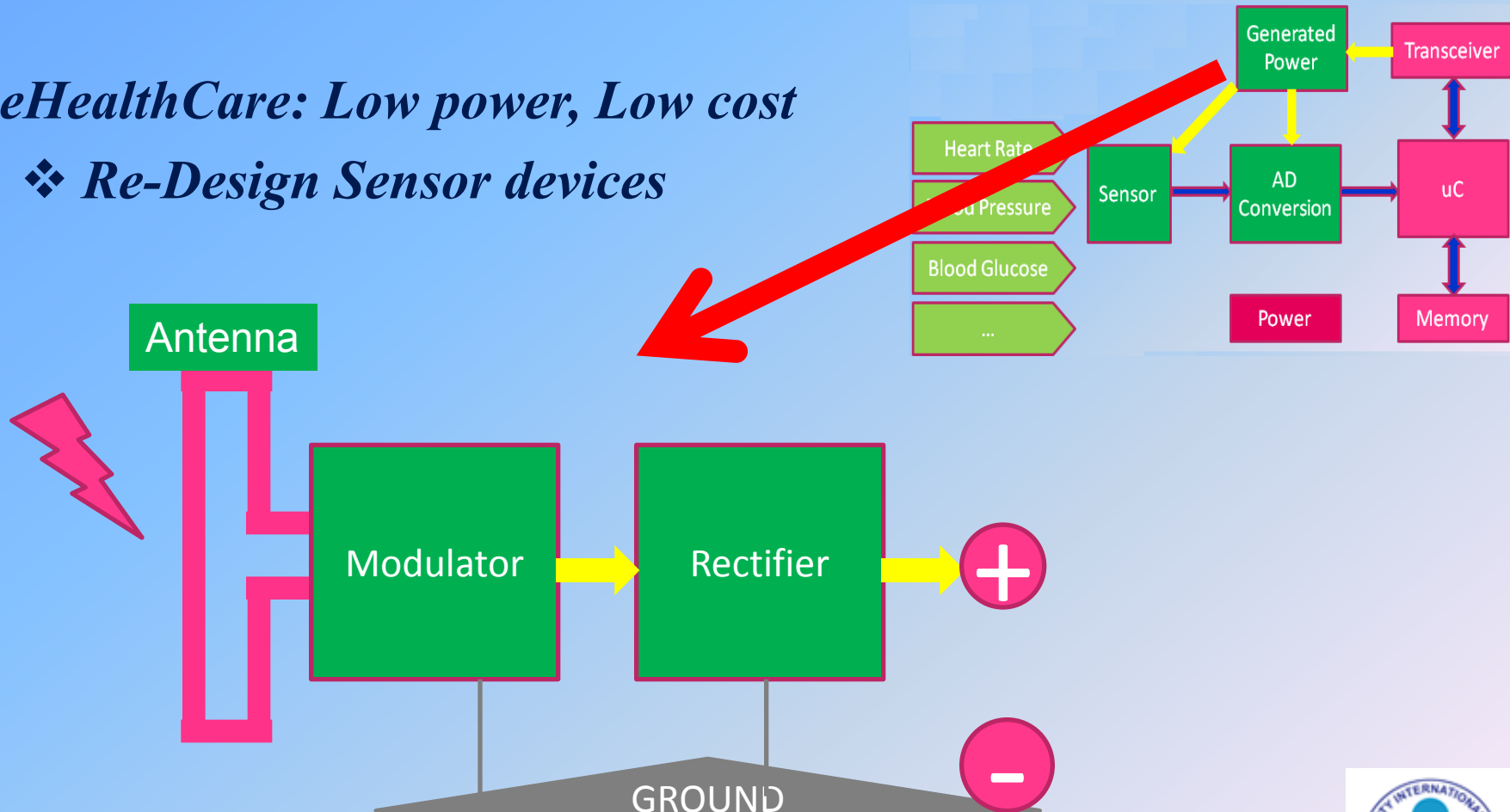
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➤ *eHealthCare: Low power, Low cost*

❖ *Re-Design Sensor devices*



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Discussions

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