IIS (Intelligent Services for WSN): A model of Service Provision for Wireless Sensor Networks

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Introduction: my lab

- Lip6 : laboratory of the University Paris 6, France.
- 1st in France, 7th in Europe, 41th in the world (2004 by Shanghai University).
- 457 researchers, doctors and professors,…
- Funded by French government, European commission,…
- 350 publications / year, 10 patents from 2002, 20 final products, 7 start-up companies.

Introduction: my team

- Our team : Network & Performances
  http://phare.lip6.fr
- 4 staffs, 39 Ph.D. students, 2 start-up companies.
- Important inventions:
  - Co-inventor of ATM network.
  - Adapted TCP/IP for Europe (Prof. Guy Pujolle).
  - ...
- Research:
  - Wireless and Ad-hoc networks.
  - Always Best Served.
  - Network control and management.
  - Need more collaborations.

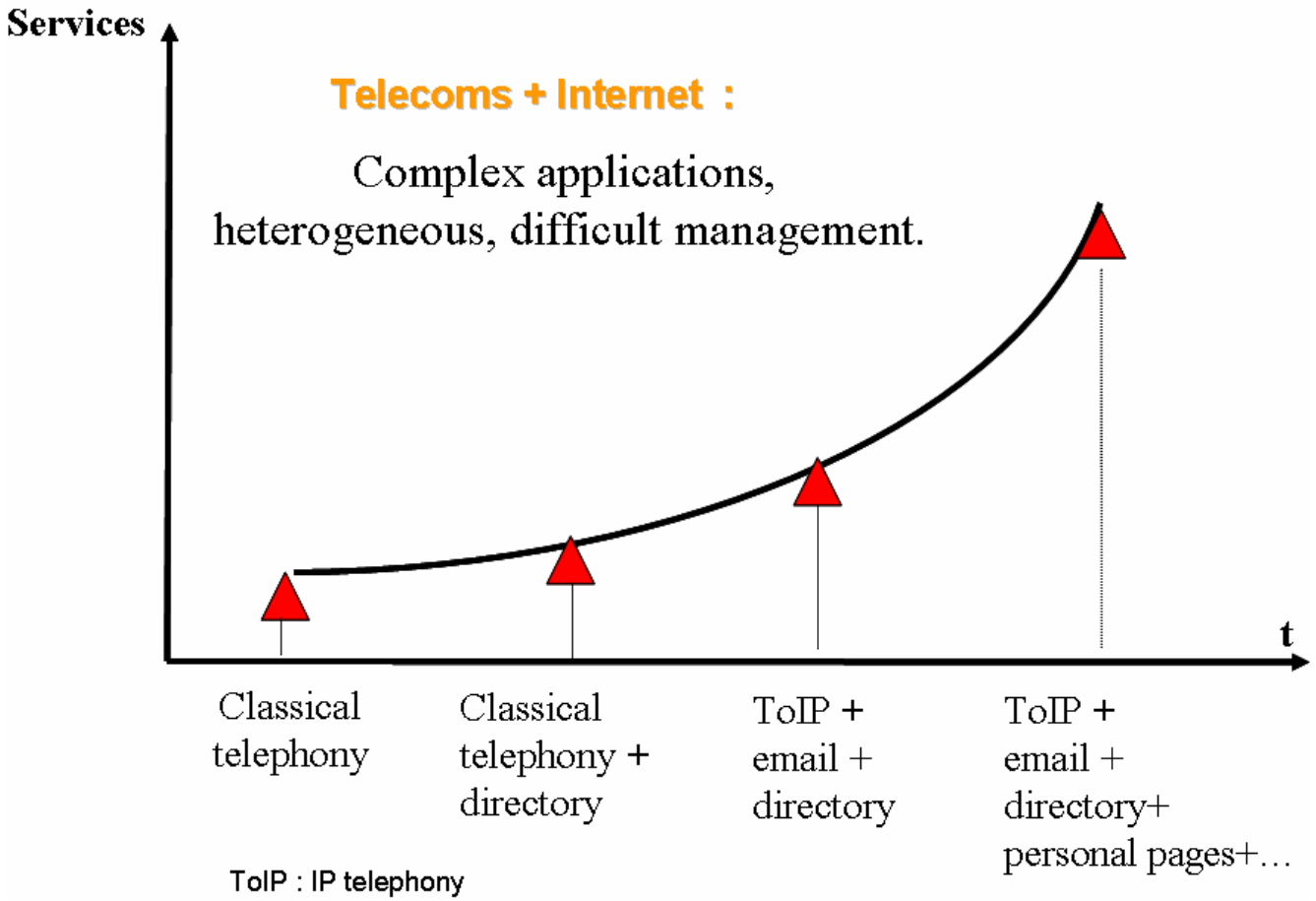
Introduction: myself

- Ph.D. in Computer Network from 2004.
- Research interests:
  - Intelligence in networking.
  - Value-added services in networking.
  - *Service provisioning.*
  - Autonomic communication.
  - Junction of Network and Service.
- 17 publications (most of articles in 2004 & 2005):
  - 1 journal ACM IJNM Internatonal journal of Network management.
  - 1 book chapter (Service) in Autonomic Networking (Hermes edition).
  - 10 international publications (1 in WOCC ☺).
  - 2 industrial patents (participated).

Outline

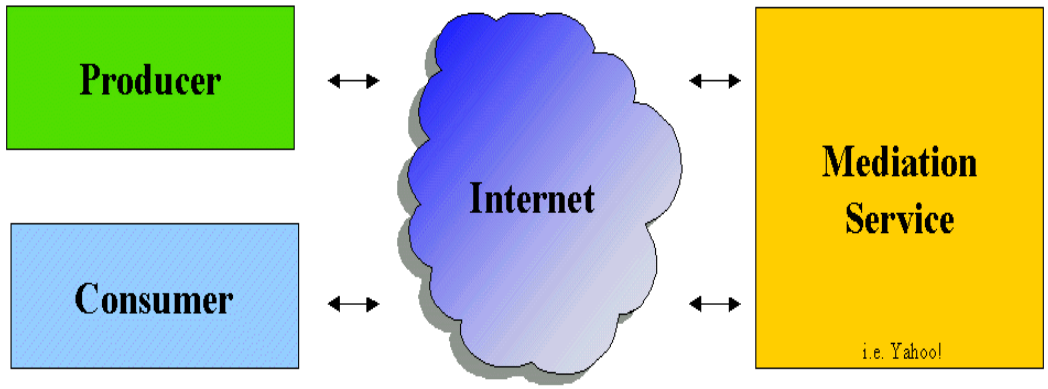
- Services anywhere
- Intermediation → open operating system
- Wireless sensor networks
- Service provision in networking
- IIS - Intelligent Services for WSN
- Conclusion

Services, services, services …



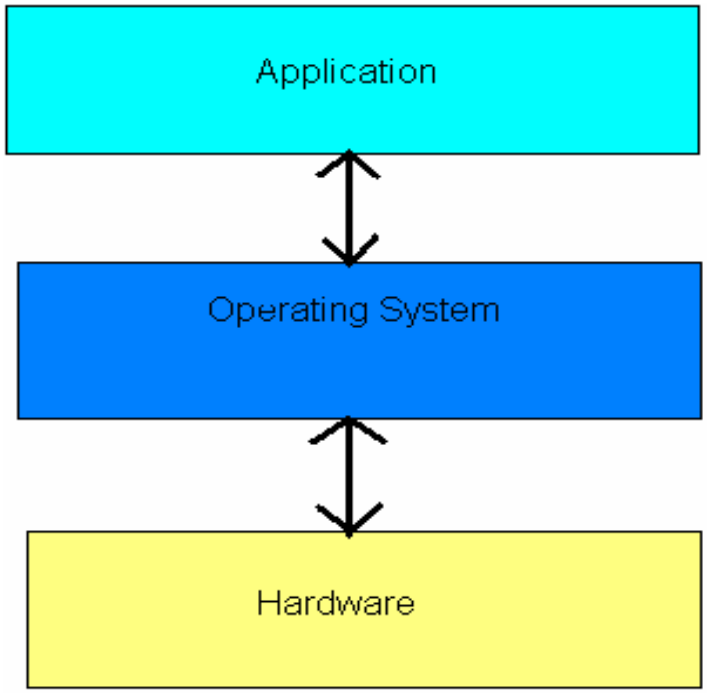
From Intermediation to "IIS Open Operating System"

- The Internet Intermediation

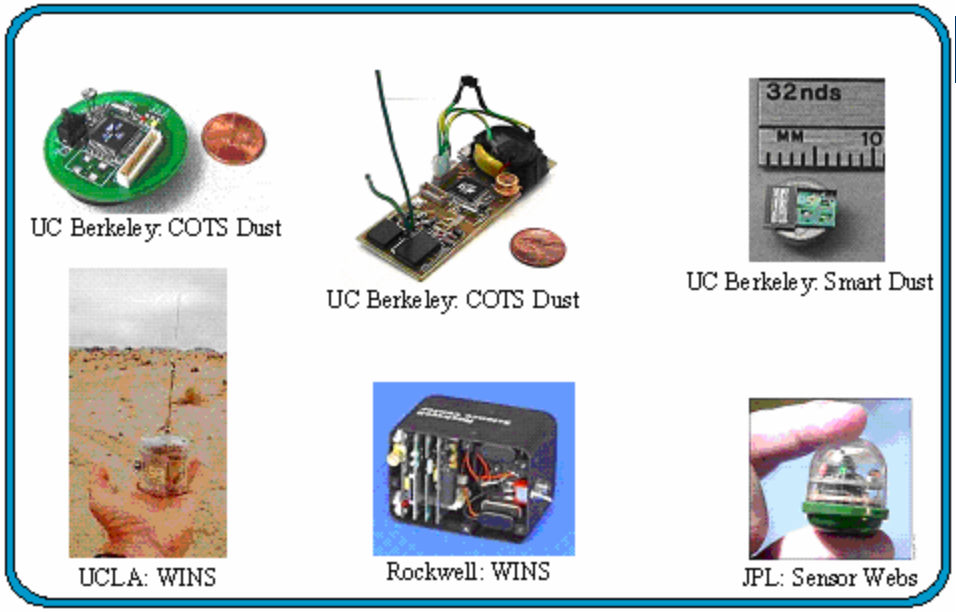


Value-addes services

From Intermediation to "IIS Open Operating System"



Wireless Sensor Networks



Wireless sesors: small devices, communicate in short distances:

-Small, low power, low cost
→years on standard batteries.
- Low data throughput → up to 115.2 kbps.
- Intelligence ?

Value-addes services in Service Provision

- Location of services.
- Utilisation of services:
  - Automation in open system: control, manage, maintain, automate.
  - Interface: automatic, semantic, interactive from user, service creator and service provider.

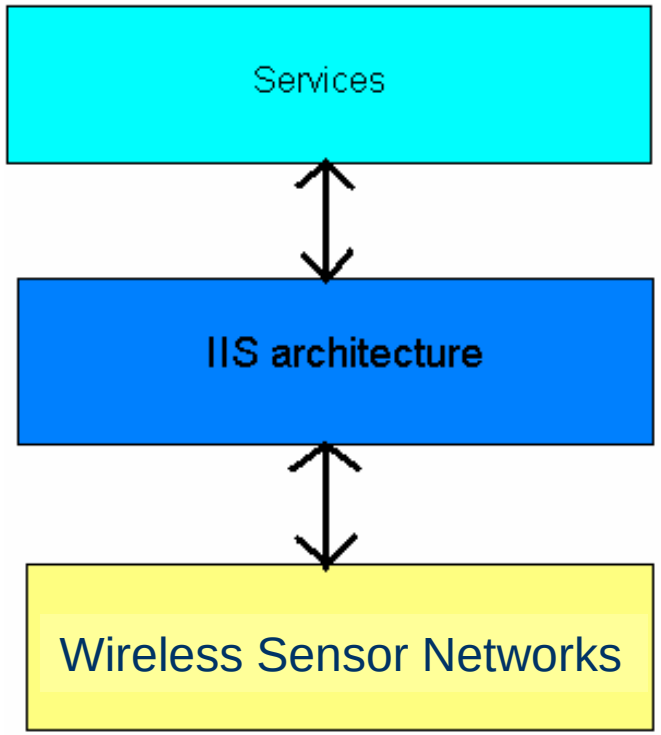
Motivation

IIS architecture = Wireless Sensor Networks + Intermediation + Value-added Services

- Future environments will be interacting with one another in a flexible manner and will able to dynamically coordinate their activities without human supervision as opportunities arise.

- (Services x→ Network) but (Network → Services). (2020 vision of European commission)

- 3 services (data,voice,video), tripleplay (multi-access,multi-technologies,multi-services)

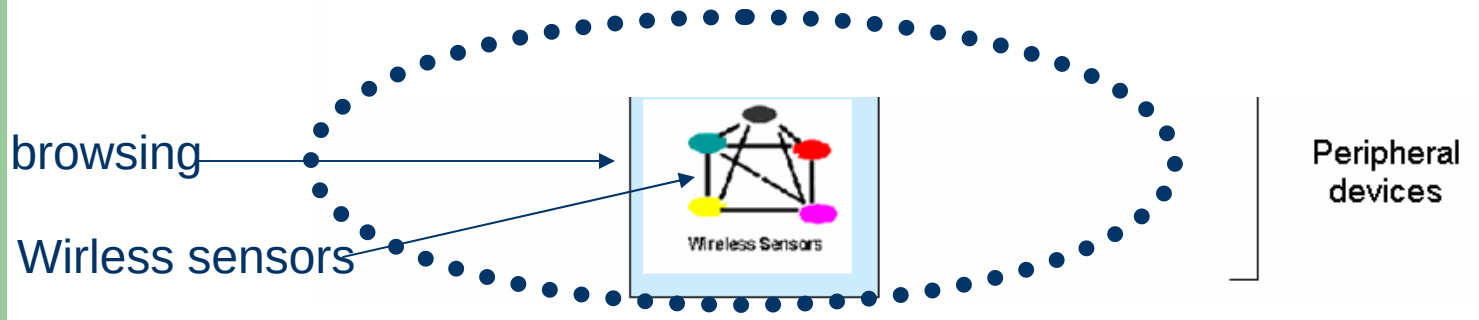


IIS architecture

Web Services

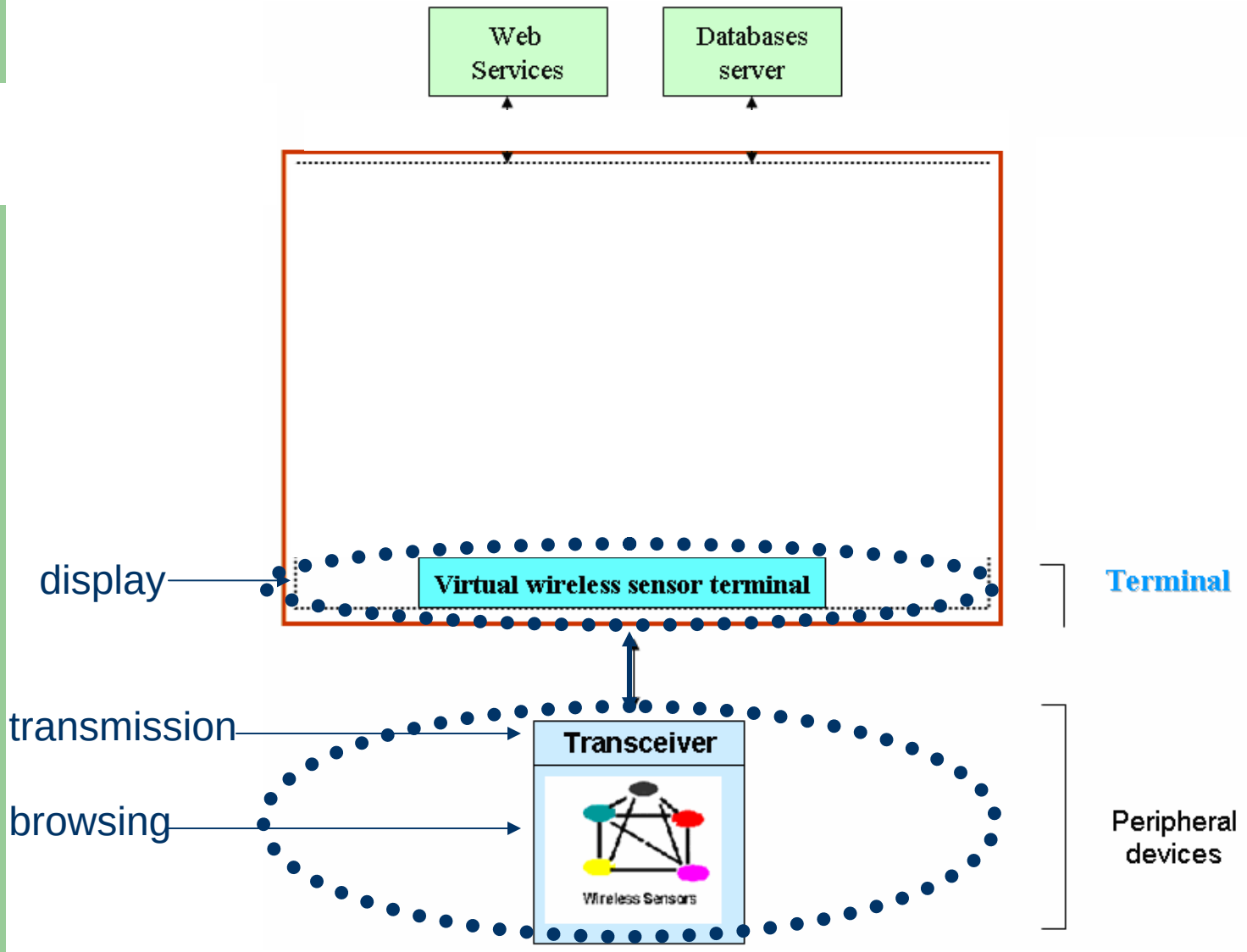
Databases server

IIS : Intelligent Services for WSN

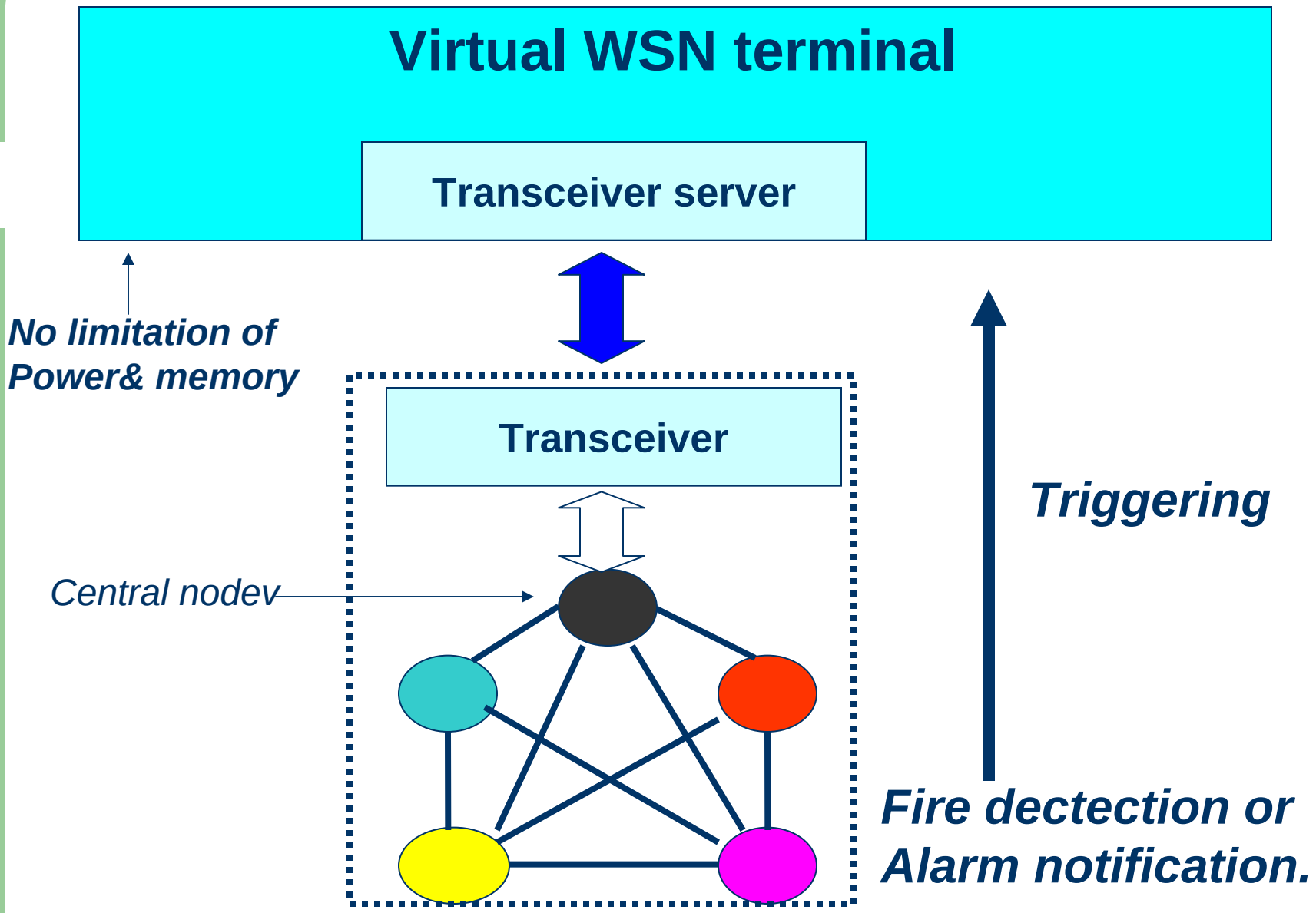


IIS architecture

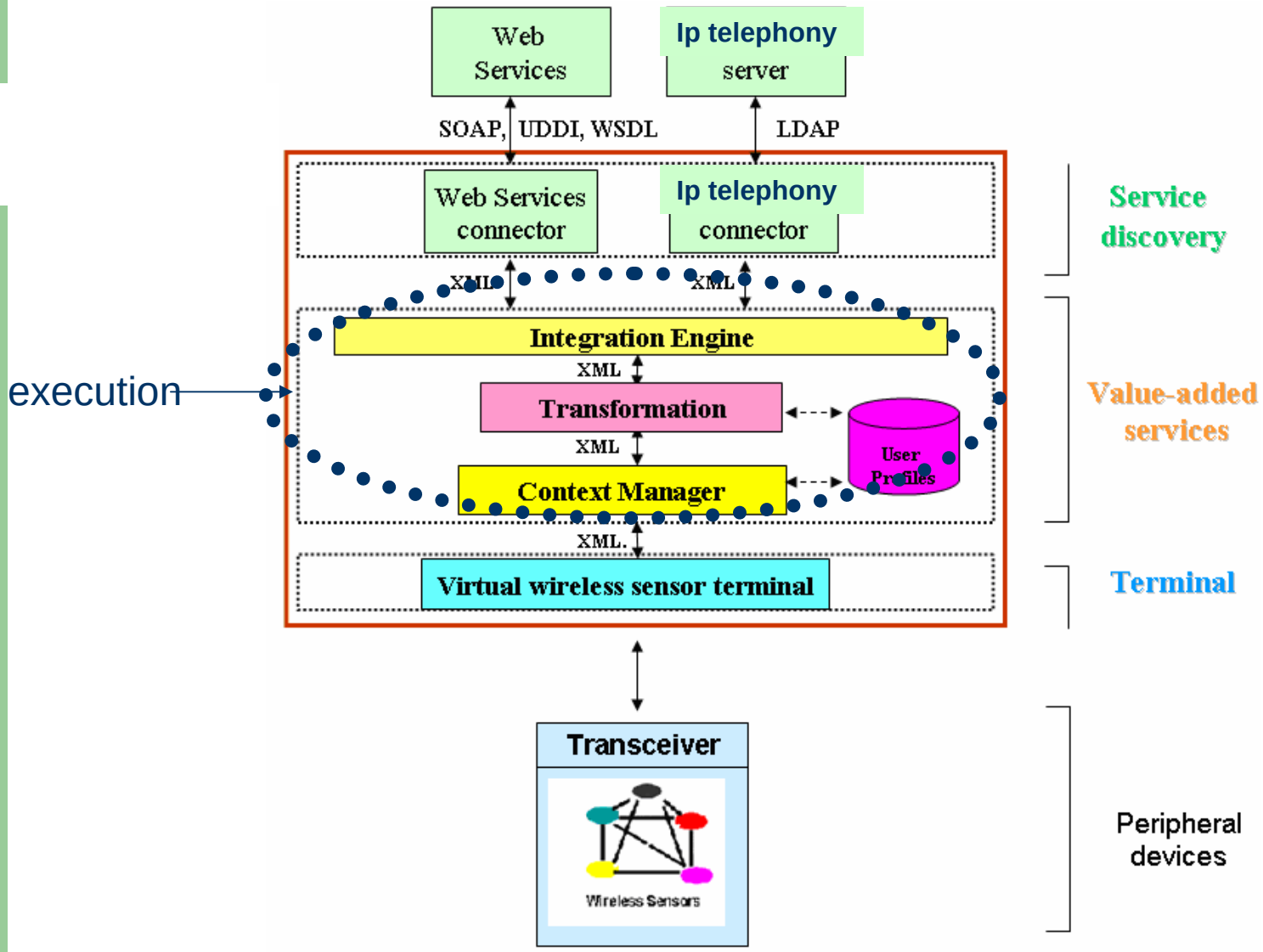
-Fire dectection. How ?
-Alarm notification. How ?



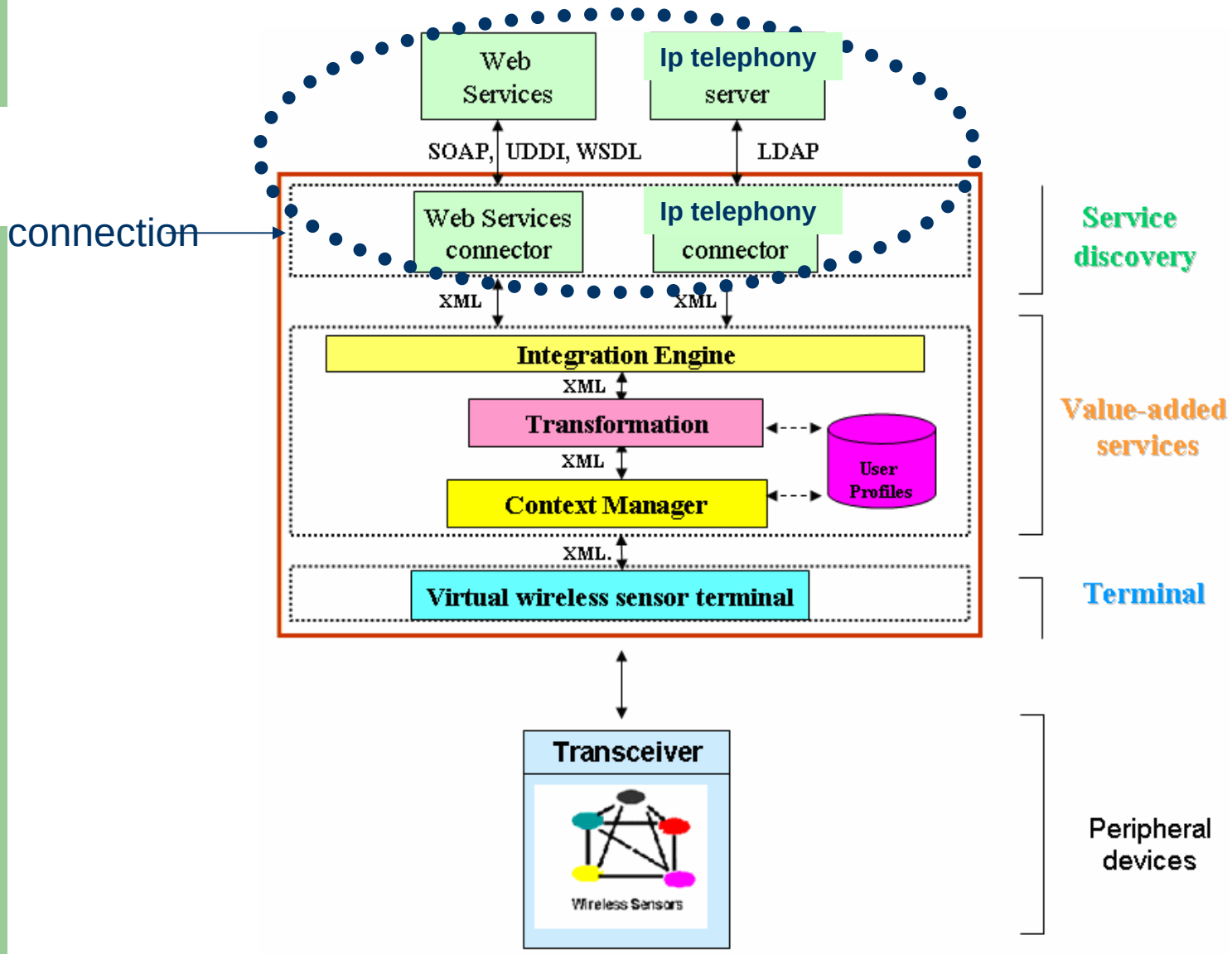
Transceiver in Wireless Sensors



IIS architecture

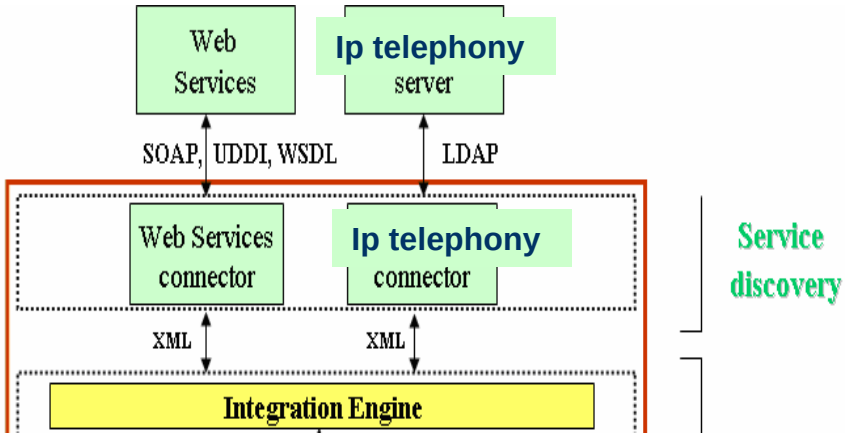


IIS architecture



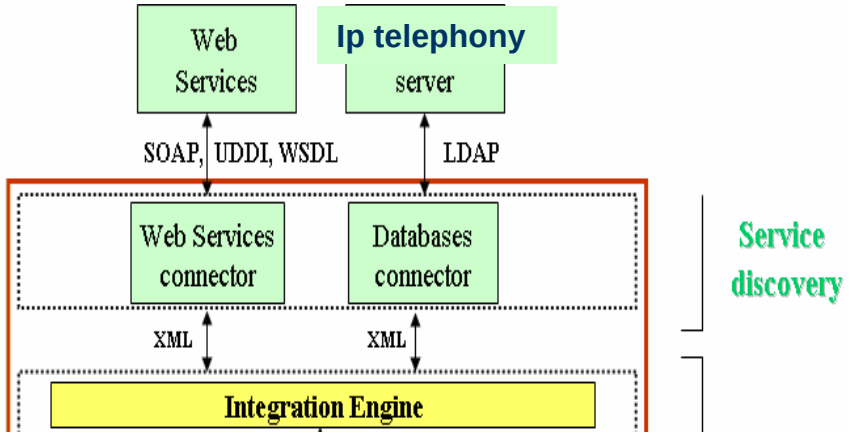
Service provisioning rules

```
<methodCall>

 <methodName> … </methodName>
 <input_Params>
     <param>
          <value> … </value>
     </param>
  </input_Params>

 <QoS_Params> … </QoS_Params>
 <output_Params> ... </output_Params>

</methodCall>
```



Service provisioning rules

```
<IIS_Service>
    <matched_Event>…</matched_Event>
    <methodCall>…</methodCall>
    <methodCall>…</methodCall>
</IIS_Service>
```



Conclusion

The key of IIS architecture:

- **Separate the software from the hardware in WSN.**
- **Development of small, low power devices that combine of multiple sensing and wireless communication capability.**
- **Open research program, build on existing standard technologies (Web,…)**

→ The solution for rapid creating new quality services on the Wireless Sensor Networks with high abstraction layers.