Update on IPv6 in Singapore

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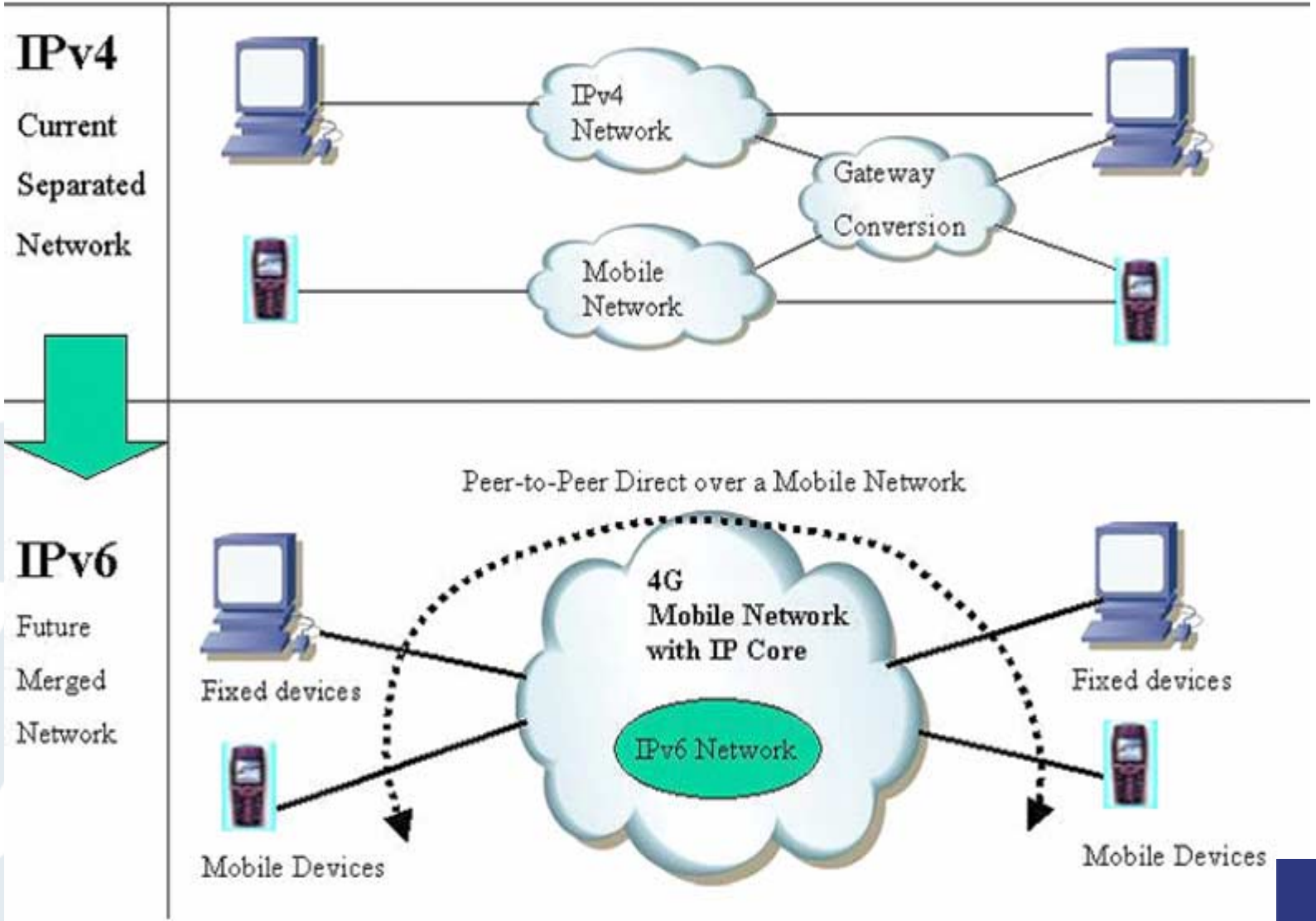
Current Situation

- IPv6 not getting anywhere in Singapore
- Recall some observations given during 2nd AP IPv6 Summit, 2004:
  - Lack of manufacturing industries in Singapore to support IPv6, e.g. network equipment manufacturers
  - Singapore ISPs have sufficient IPv4 addresses to meet the needs of the local user pool → IPv4 addresses in Singapore still not exhausted & lack of killer applications for IPv6
  - Need to start planning in order to see IPv6 deployed in 2006-2008

Converged IP Network Architecture with IPv6



Killer Applications?

- Current Internet/InfoComm applications and services are human-centric
- Human-centric market is becoming saturated
- New potential customers beyond human beings
- Machine-to-Machine communications (M2M) has huge market potential due to the fact that machines outnumber humans by a ratio of at least four to one
- M2M is not new!

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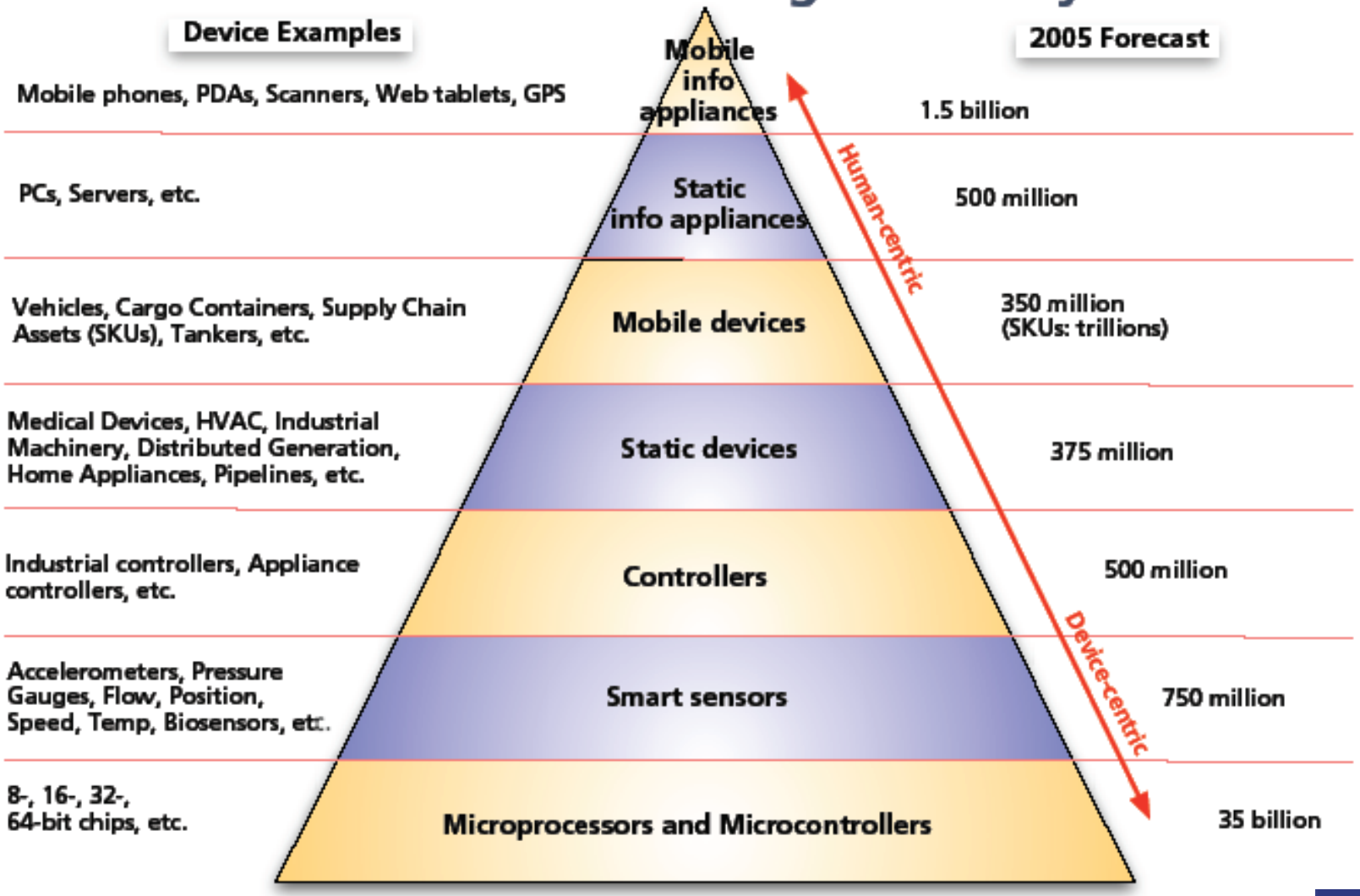
Device Networking Hierarchy



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M2M

Wireless machine-to-machine communications

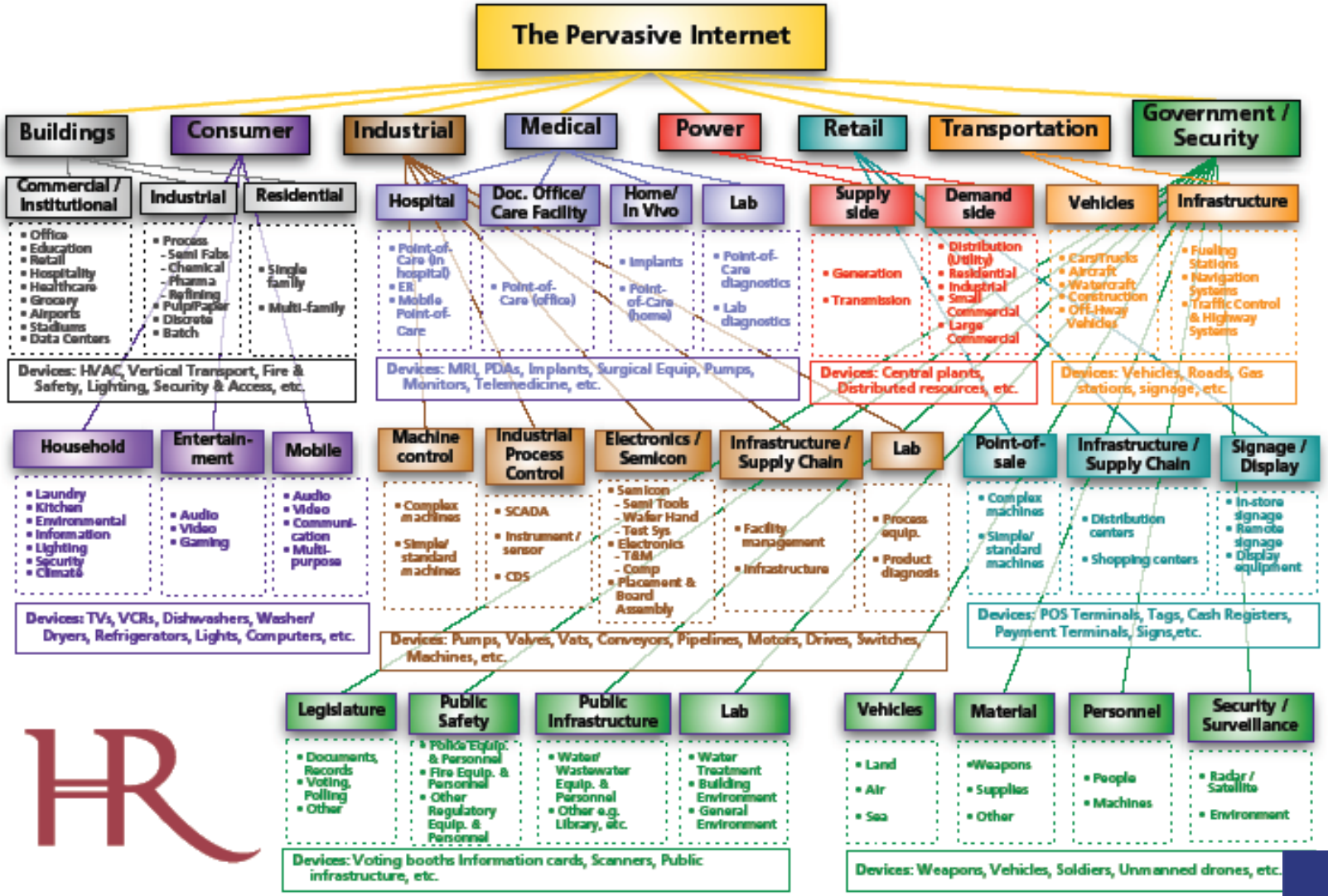
= M2M =

Wireless Telematics

M2M is usually accepted as wireless communications with/between machines

- machine-to-machine, communication between machines
- machine-to-mobile, e.g. remote monitoring by the user
- mobile -to-machine, e.g. remote control by the user

Venue Segmentation Map for Intelligent Device Networking & Management



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M2M Definition and Goal

- M2M is a term to identify a group of businesses and applications that achieve a device computing.
- M2M platform enables more networked-devices to communicate each other without human intervention.
- M2M goal is to create value-added services to automate the business process over the communication networks: IP and Mobile, Wired &Wireless, Packet Data Network, etc.

The networked-devices include the following:

Controllers, Smart Sensors, RFIDs, PCs, Hand-held devices

M2M Characteristics

- Embedded
- Robust (work in harsh conditions)
- Reliable (fault tolerance)
- Realtime (msecs to hrs/days/mths)
- Secure
- Power may not be an issue

M2M Technologies

- Existing WPAN, WLAN, WWAN, etc. technologies can be used
- There is basically no M2M standardization → strongest technologies will develop into de-facto standards
- From technology perspective it is quite clear that no wireless technology can provide such QoS that life-critical M2M services could be implemented in the near future

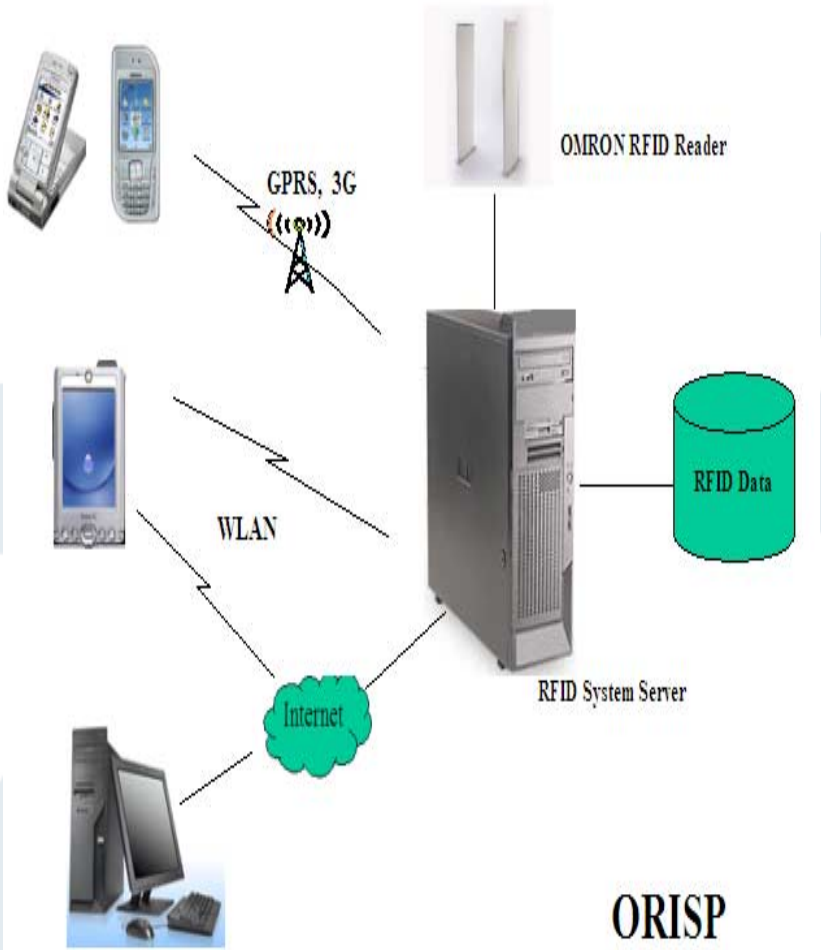
M2M Beneficiaries

Telecommunication
IP, Wireless and Mobile Networking
Healthcare
Process, Factory Automation
Building Automation
Telemetry, Remote Monitoring/Control
Supply Chain, Logistics, Warehouse
Security, Surveillance, Asset Management
Telematics, In-Vehicle Applications
Sensing, Virtual Instrumentation
e-Business and m-Business
Mobile Learning, Education

M2M Potential Benefits

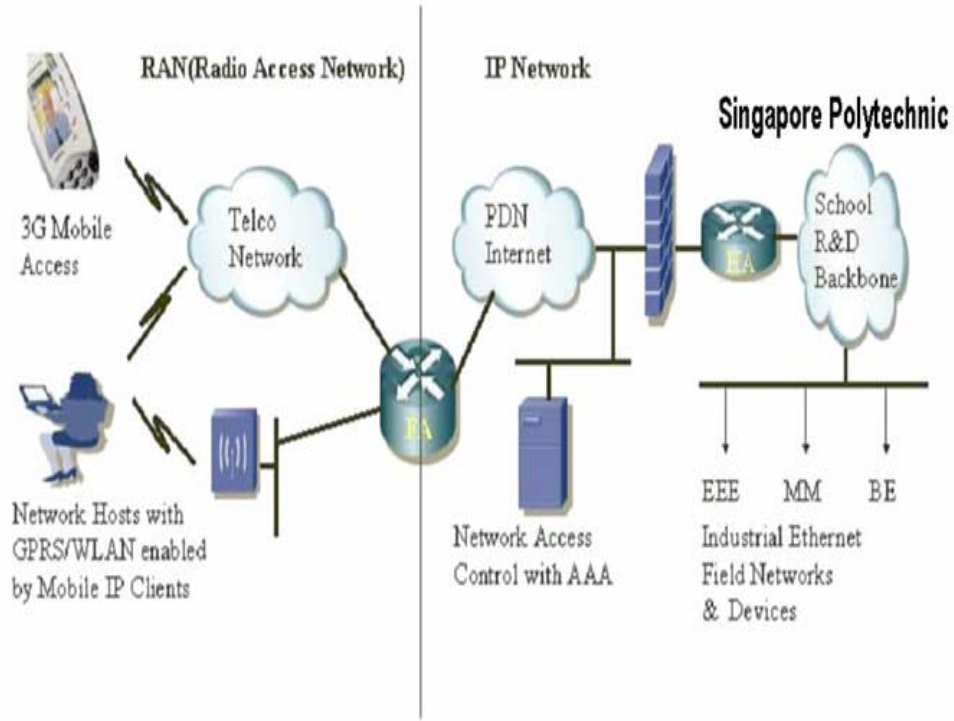
- Revenues generated by service models
- On-going services rather than a one-time product sales
- Preventive maintenance by continuous access to devices
- Customized and cost-effective support by systems
- Centralized data and network management support
- Improved productivity from less down time
- Remote monitoring, diagnostics and real-time statistics
- Improved response for (remote) troubleshooting in a plant

M2M Application

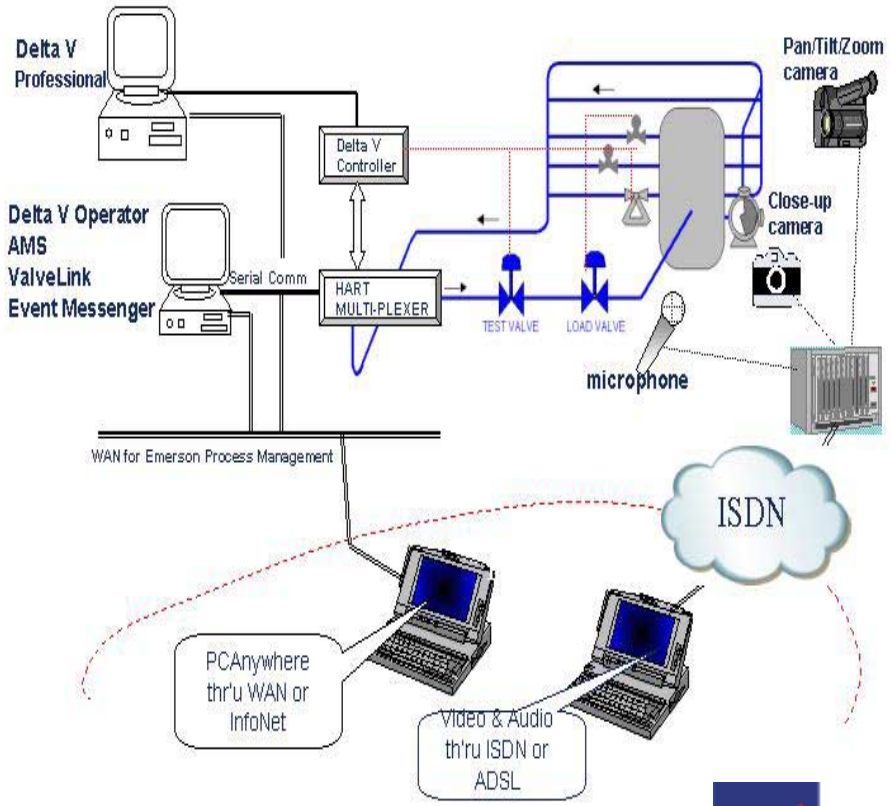


M2M Application

IP & Mobile Network Architecture

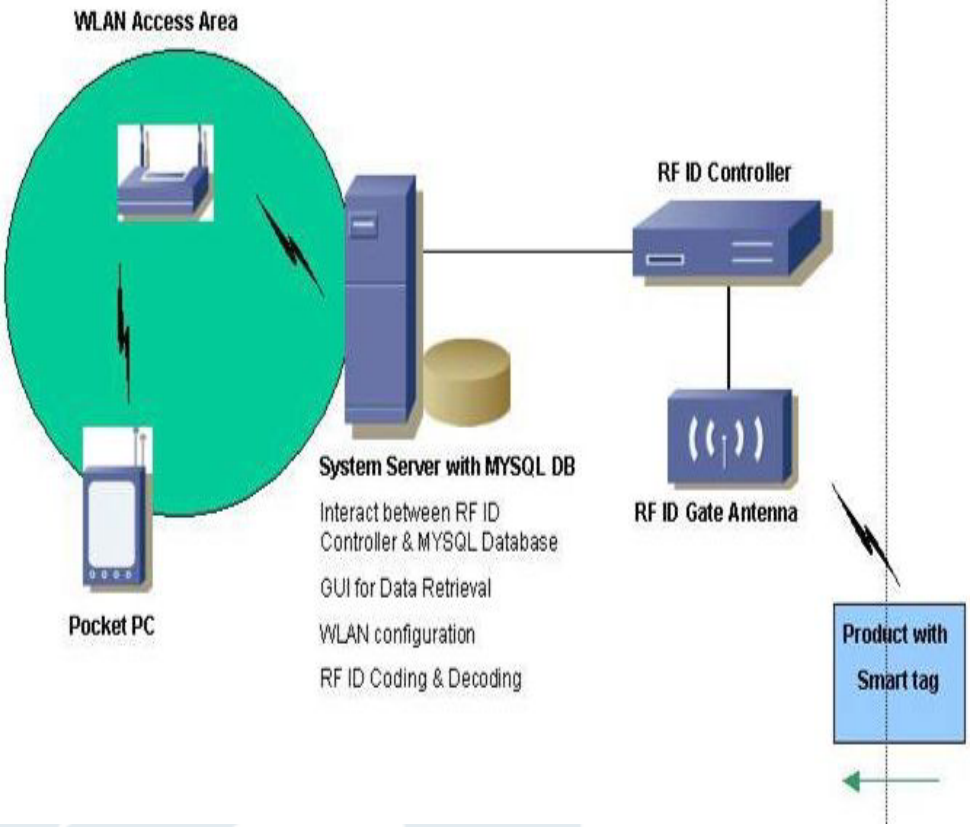


Process Loop Control Network via ISDN

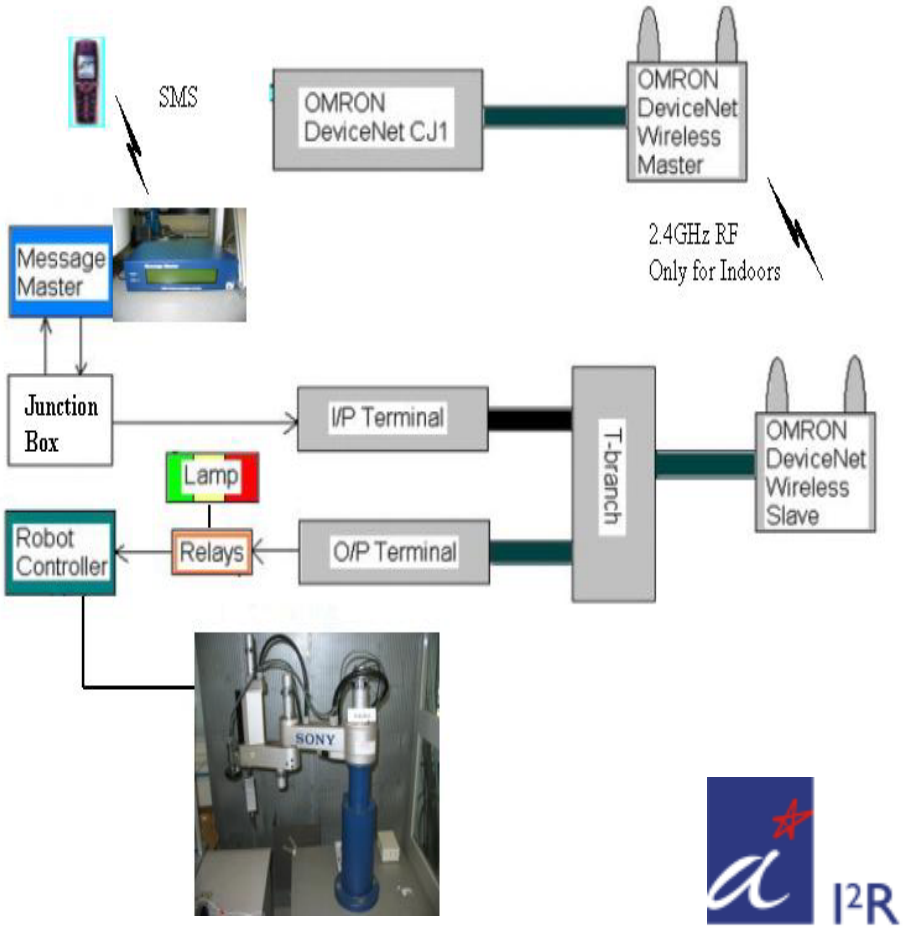


M2M Application

Inventory Management System By Using RF ID and WLAN



Wireless Robot Control and Monitoring System



Future for IPv6 ?

- As the new generation computing platform is not only for humans, but also for devices, the impact is invisible and unpredictable.
- IT providers and communications sectors are still quite contended and there appears to be no urgency to deploy IPv6.
- Conventional non-IT industry sectors, like automation, engineering, equipment, logistics, building/construction, sensing/control, telemetering, etc are looking for new ways to increase their revenue through the adoption of IT.

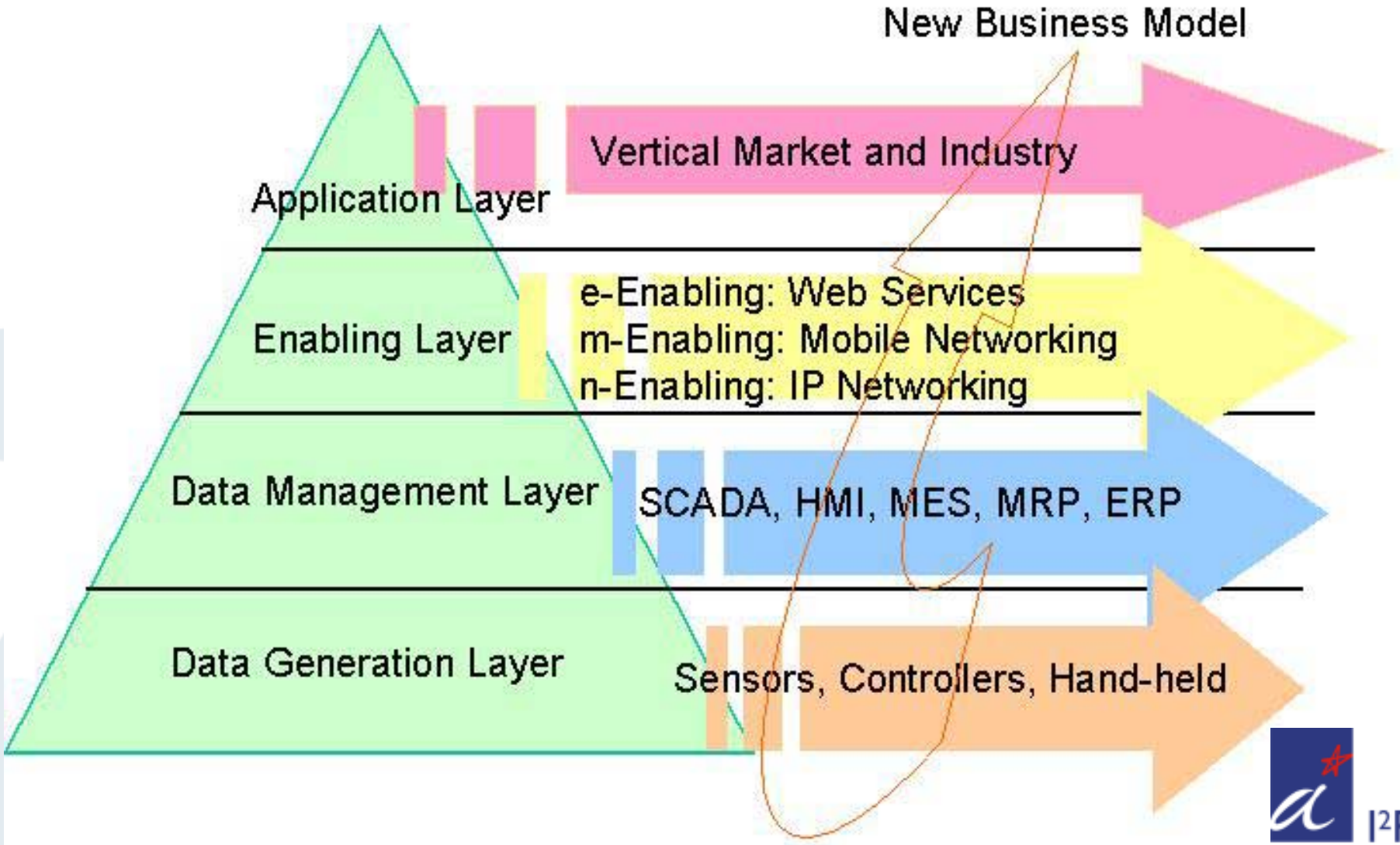
Industrial InfoComm Technology

- I^2T Initiative - brainchild of the Singapore Industrial Automation Association

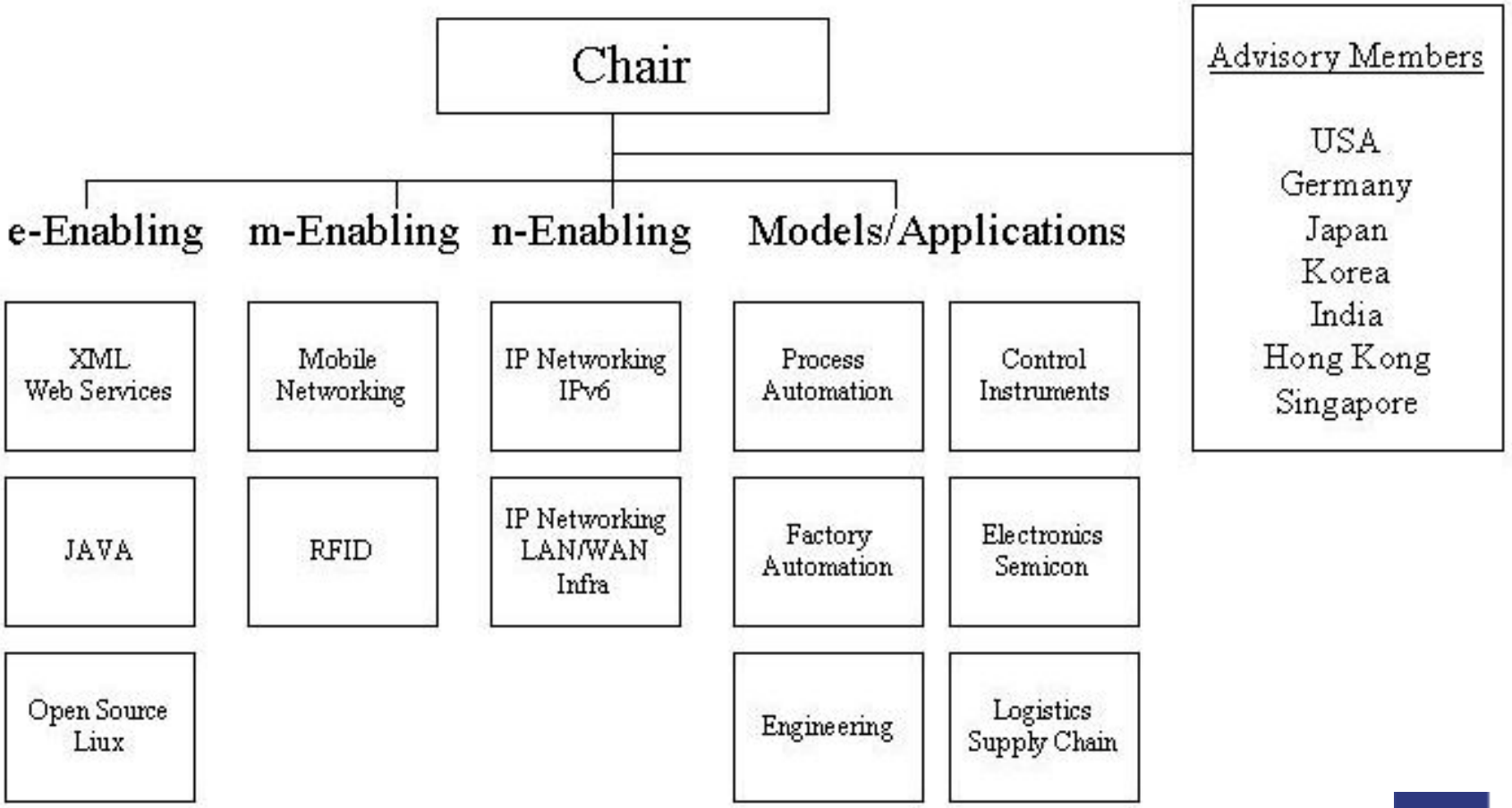
  http://www.i2t.com.sg

- Proposes an industry development model for the use of infocomm technologies in non-IT industry sectors
- As we increasingly depend on machines to improve our quality of life, developments in device computing has also become more important and the I^2T development model aims to be the engine to drive next generation M2M

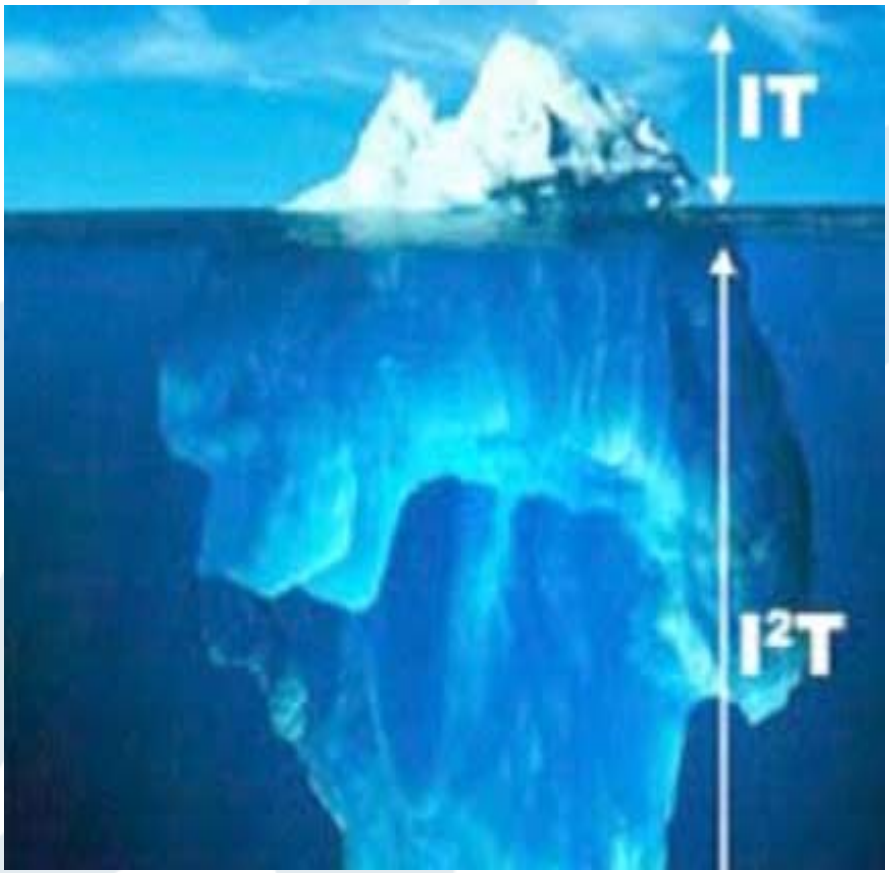
I²T Development Model



I²T Technical Interest Groups



I²T Potential



"I²T is a huge iceberg of which the size under the surface is unknown and invisible at this time."

Conclusions

- M2M may be the killer app for IPv6
- Industrial automation community in Singapore is championing the Industrial InfoComm Technology initiative that focuses on M2M with IPv6 as one of the key enabling technologies
- If you can't convince humans to talk IPv6, then let's make machines talk IPv6

Acknowledgements

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- Developer, M2M model and M2M Consortium
- Chairman, M2M Interest Group, Singapore
- M2M Facilitator, Singapore Industrial Automation Association
- Chair, Regional Industrial Networking Conference, Singapore Polytechnic
- Lecturer, Singapore Polytechnic