

Post-IP Internet

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Next Generation Internet

In

Post-IP era

From

**Mobile/Wireless Requirements
points of View**

Current and Future

- Participation open to all e.Mobility members**
- ~35 Organisations active in
White Paper**

**[http://www.emobility.eu.org/Working
Groups/PostIP/WhitePaper_v0-6.pdf](http://www.emobility.eu.org/WorkingGroups/PostIP/WhitePaper_v0-6.pdf)**

What are future services and how their usage is evolving?

» **Editor: Henrik Berndt, DoCoMo**

What are technical challenges?

» **Editors: Frank –Uwe Andersen (Siemens)**

Roadmap & Impact

» **What can Europe do? and How?**

» **How to achieve major and timely impact? Do we have right standardisation process and forum in place?**

» **Editor: Henrik Abramowicz (Ericsson)**

Definition



Post-IP \neq IPv7 or IPv8 or IPvxx

**Post-IP = Next Generation
Internet protocols and
architecture**



Post-IP Focus

Mobile/Wireless systems Requirements

Justification

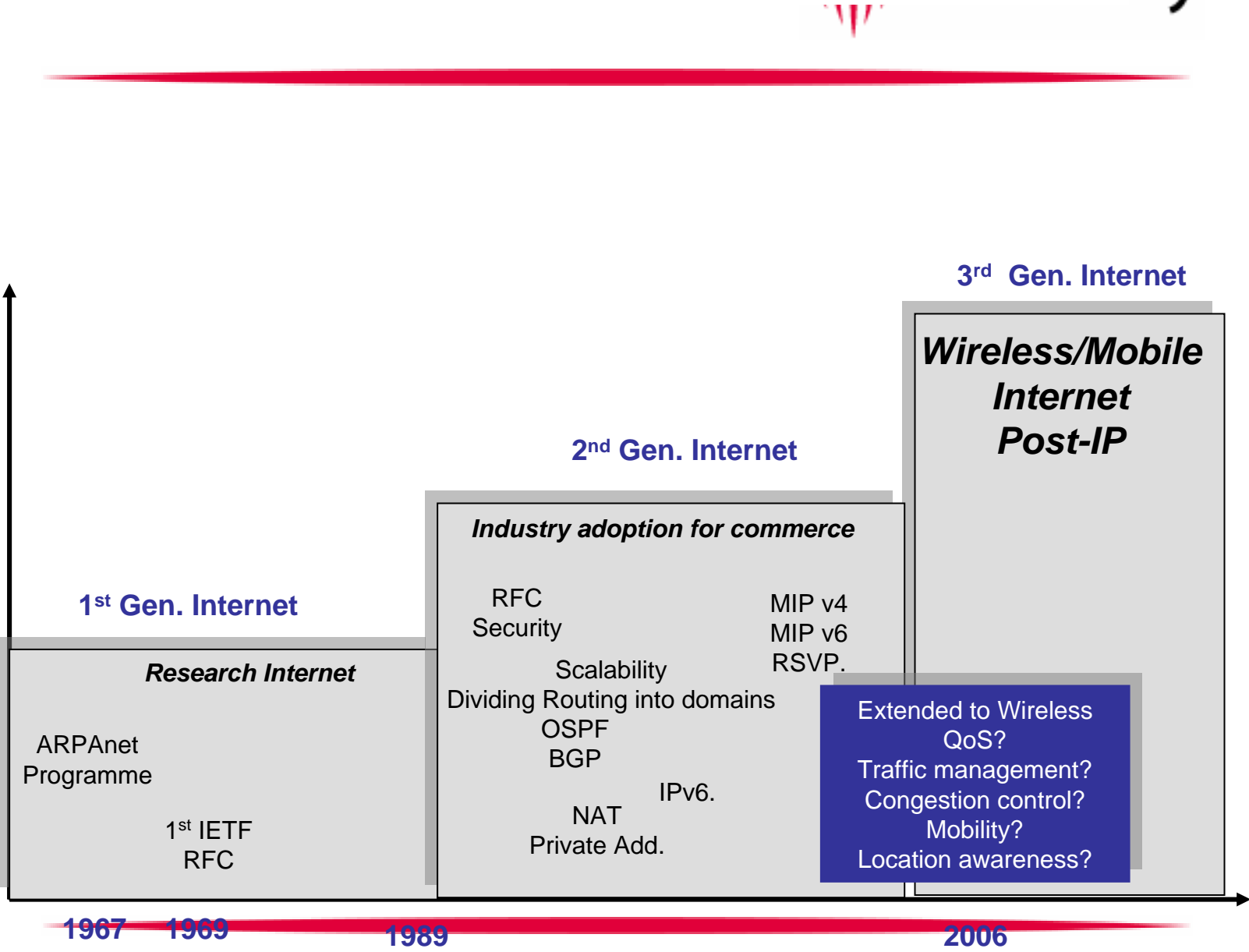
- Over 2.5 billion mobile phones worldwide,
 - Only 500 million wired Internet terminals,
 - Significant fraction (~20%) of these phones now have Internet capability through the 2.5G and 3G cellular services

 - In less than 5 years, all mobile phones expected to be Internet-capable devices
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Why Post-IP (Revolutionary) approach

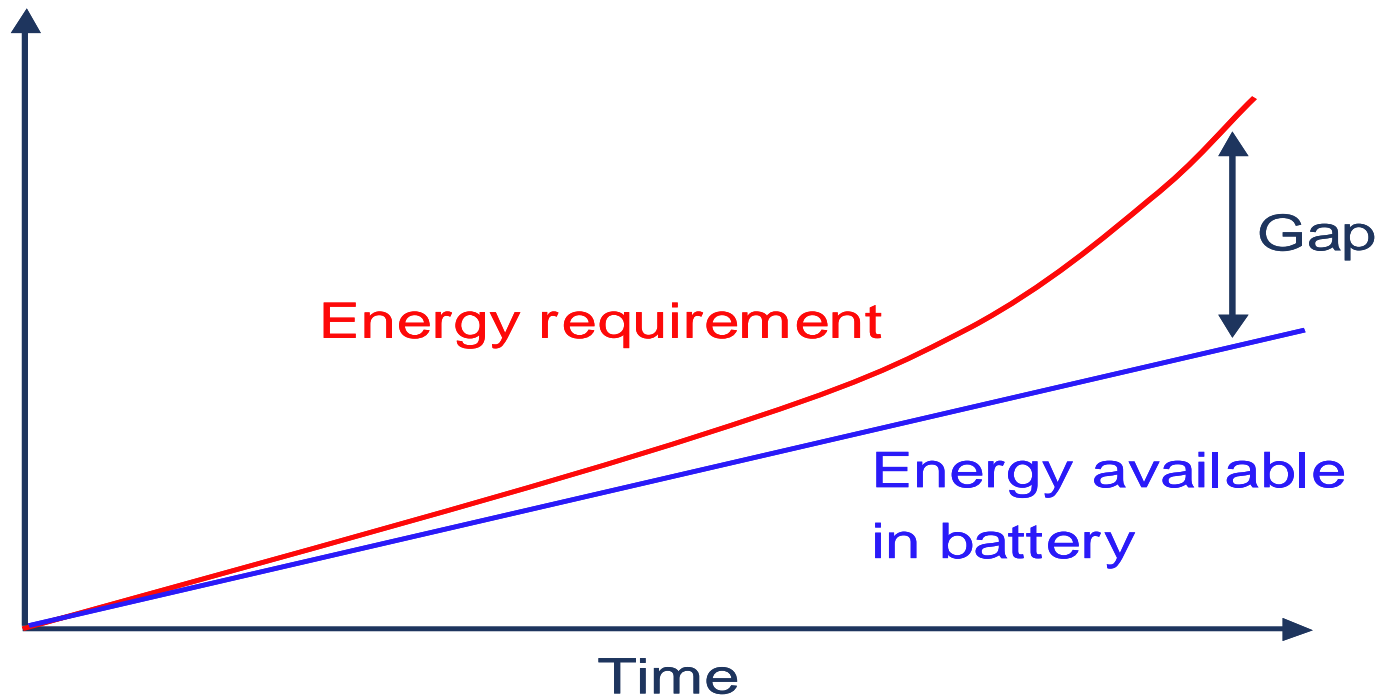
Internet Generations



Future Mobile Communications

- ❑ **Power/bandwidth limited**
- ❑ Dynamic in nature (Intermittent and dynamic connectivity)
- ❑ Variety of service delivery modes:
 - ❑ **Uni, multi and broadcast**
- ❑ No more one person one device,
 - ❑ more likely one person many devices and **device to device** communications
- ❑ **Cross (layer, spectrum, network) operation**
- ❑ Self-organisation & network management & QoS management
- ❑ Shifts from *networking of networks* towards *services networking*
- ❑ More emphasis on **security, privacy, trust and dependability**
- ❑ Flexible billings (**flat-rate as well as distance-based**)

Energy Crisis eMobility



Internet Protocols are NOT power efficient



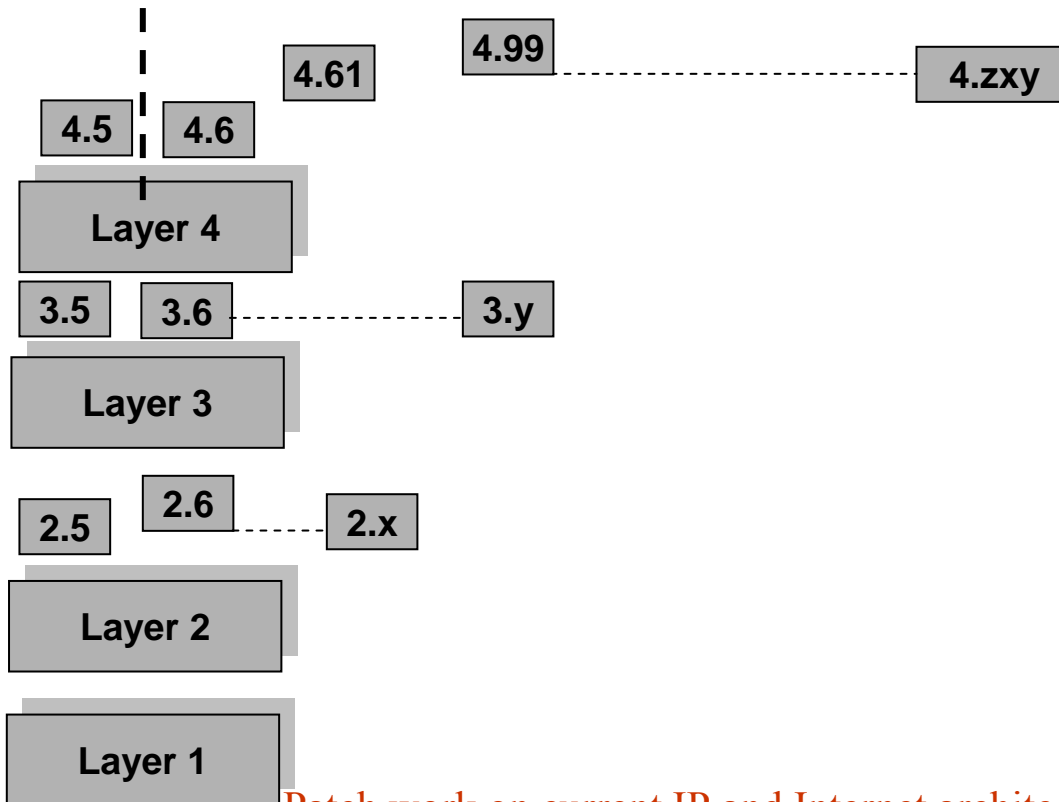
- ❑ According to ITRS (2004 revision), **power consumption in nanoelectronic devices must be reduced** by 75% until 2010 and **by 95% until 2016**.
- ❑ Battery technologies will need to be able to cope with the increased power needs of new VLSI systems
 - ❑ Currently, CMOS technology scaling, frequency increase and augmented capacity of the interconnects move at a much faster pace than the growth in battery capacity.
- ❑ Cost of memory is ongoing decrease trend
- ❑ VLSI advances will not solve the problem as major energy consumptions is due to higher layer protocols excessive signalling

Spectrum Crisis

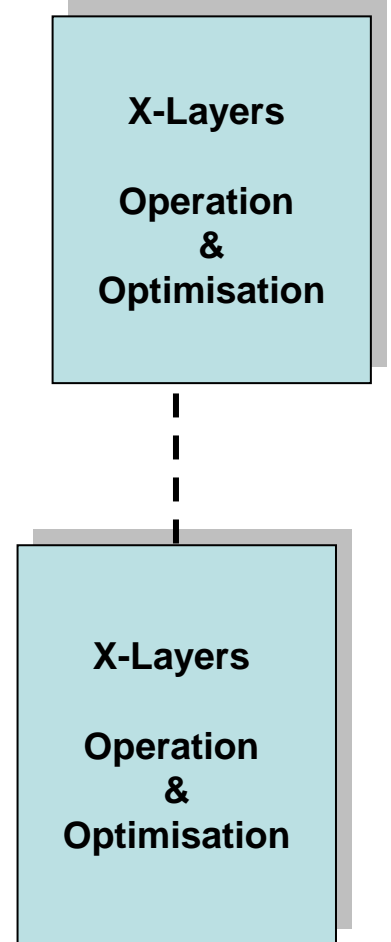
Stateless Network vs. Statefull Network

ability

Current Research Approach



Implications



Patch work on current IP and Internet architecture.. Evolutionary

A Tale of Two (Cities) Worlds eMobility

❑ IT World Approach:

- Patch work to existing IP and Architecture
- Acceptable if scalable (why? lack of manageability)
- Network imposes max delay!!!! Shouldn't this be requirement from a service/application?

❑ Mobile/Wireless Approach:

- Statefull systems,
 - Requiring dynamic management of scarce resources
 - Adaptive to radio/services dynamics
 - Security, Mobility key functions
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Post-IP Definition

Revolutionary Approach



Sources of Current Internet limitations:

- Architecture
- End-to-end paradigm
- Internet Protocols

Post-IP approach:

- New Architecture with management capability supporting multi-domain
- New Wireless-friendly (Energy and spectral efficiency) Protocols capable of supporting variety of wireless networks, from very low power sensor networks to wide area mobile networks

Services in a Post IP environment

- Transformation of service provisioning
 - Context-aware service delivery
 - Proactive services
 - Open ubiquitous services
 - Service-networks
-


Recommendations

Services point of View




Complexity will grow with service plurality leading to new requirements on control and management of services provisioning. Conflicts emerge between new ways of service provisioning and the existing limitations of the current IP networking environment.

R(1): Future research has to provide the means to overcome the IP limitations and allow for management of new level of complexity



R(2): Allow for a wide spectrum of horizontal and vertical services offerings as options within a general service framework as well as for new business interfaces to freely embrace current Internet and mobile world and future service solutions, without restricting the degree of freedom the Internet provides today.



R(3):Future service provisioning solution have to take into consideration human mentality and customer behavior patterns that ask for carefree services that provide discovery mechanism, personalization, guidelines on “how to use” and a recognizable party that is responsible for overall customer care

*The future Internet or “Post-IP” is an optimised network- and service- layer solution to the ubiquitous, mobile service-enabled communications between $\sim 10^{12}$ mobile devices and billions of human users with guarantees and built-in orchestrated **security, reliability, robustness, mobility, context, access, service support and management** of the communication and services.*



Recommendations

Technical Challenges Point of View



- R(4): Design an overall system with integrated as core functionality (Mobility, QoS, Security) supporting intermittent and dynamic connectivity with energy and frequency constraints in mind
- R(5): Create and evaluate alternative, breakthrough and beyond-OSI layering architectures, to overcome static layering and its disadvantages. Enable services to exploit network context information, and use self-organizing technology for optimisation.
- R(6): Decouple the IDs of information objects from their addressing, incl. users, nodes, documents, interfaces, domains and other structures. A key component of post-IP is its naming and addressing structure must not be restricted or tied to the architecture.
- R(7): Specify a migration strategy between current and Post-IP
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Maximising European Impact eMobility

Recommendations

R(8): Build on **FUTURE INTERNET** on European strength and competence in **mobile networks** adopt a holistic approach to future architecture design

R(9): **Coordination across** different projects with a well established support action

- Build on European **pre-competitive research tradition – large FP projects** for consensus building, a good mechanism for preparation of future standardisation
- Ensuring collaboration between research projects and test-bed activities
- Global collaboration** supported by the EU and support action in order to take initiative internationally

R(10): Identify **early** suitable **standardisation** process and forum

Thank you

Difference between IETF and 3GPP



- ❑ **IETF** work mainly on specification of protocols
- ❑ In the telecom industry, the word "architecture" is understood to mean "network architecture", or the kind of "architectures" that show functional units, such as "SGSN", "GGSN", "Node-B", and abstract interfaces in between such as "Gn" or "Gi" as standardised in **3GPP**