The Architecture of the BRAIN Network Layer

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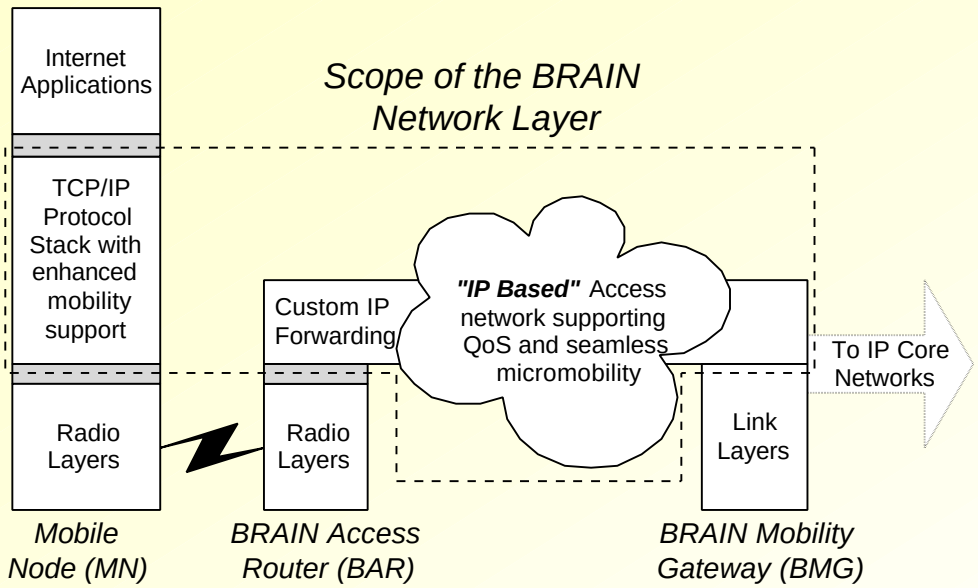
BRAIN at the IST Mobile Summit

BRAIN overview	"Broadband radio access for IP-based Networks (BRAIN)"	Session 1C: 4G Networks
BRAIN services	"BRENTA - Supporting Mobility and QoS for Adaptable Multimedia Communication"	Session 4B: Mobile Multimedia
BRAIN network layer	"The architecture of the BRAIN Network Layer"	Session 5C:Mobile IP
	"A first evaluation of IP based network architectures"	Session 2C: Converged Networks
BRAIN air interface	"BRAIN Enhancements for HIPERLAN/2 interface Air Interface support QoS in Wireless Communications"	Session 1A: Local Area Networks
	"First performance Results of BRAIN"	

Scope of the BRAIN Network Layer



- **Supporting standard and enhanced applications in the MN (BRENTA)**
- **Building on any air interface (initially HiperLAN/2)**
- **Attaching to 'standard' IP fixed core networks ('The Internet')**
- **In the access network, "Fully IP Based"**

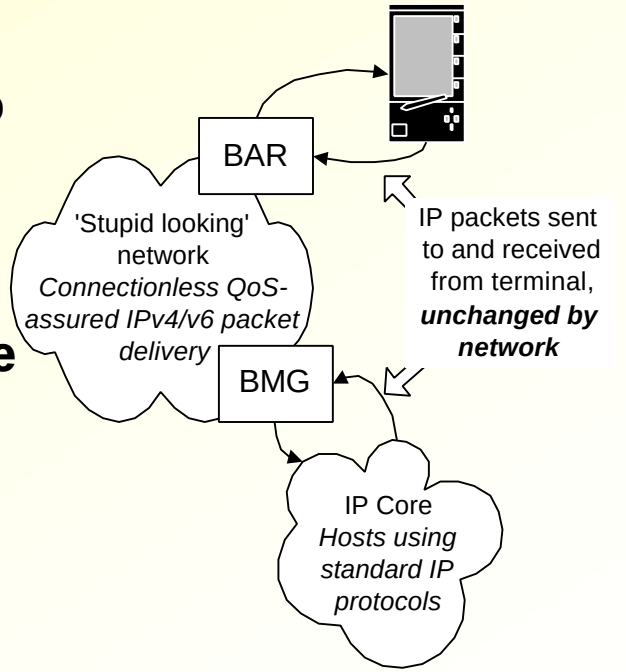
  (whatever this means …)

The Network Layer Problem for BRAIN

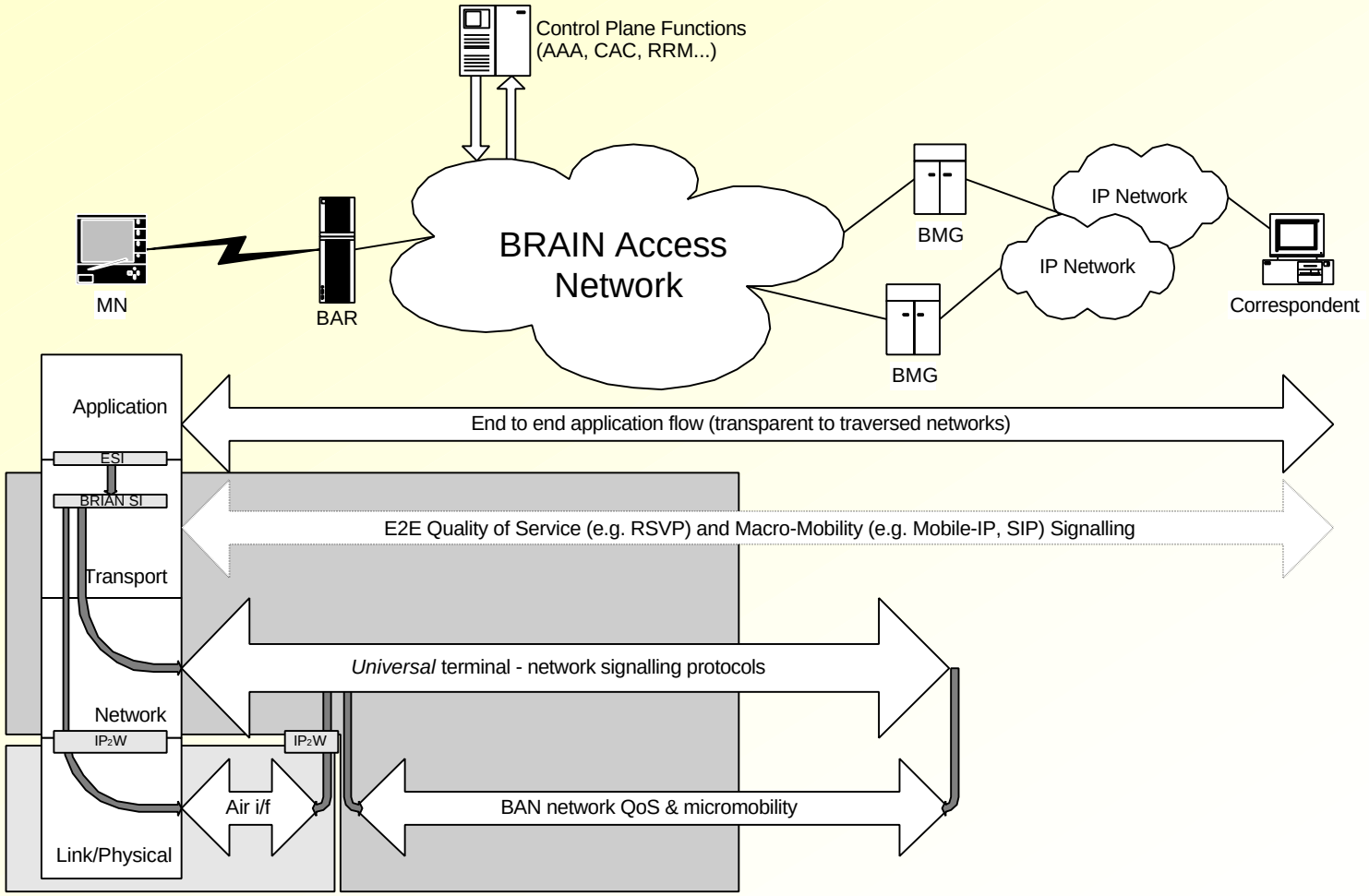
- What it is (within the Access Network):
  - Handover support (fast, smooth, seamless etc. etc.)
  - Quality of Service support
    - Admission control & pre-emption
    - Negotiation with applications
    - (Billable) Guarantees
  - Applicable in public and private environments
- We are looking for self-contained solutions
  - which simplify the mobility problem for other protocols
- What it is not:
  - Yet another set of options for Mobile IP/IPv6

Design Principles (or, What Is "IP-Based?")

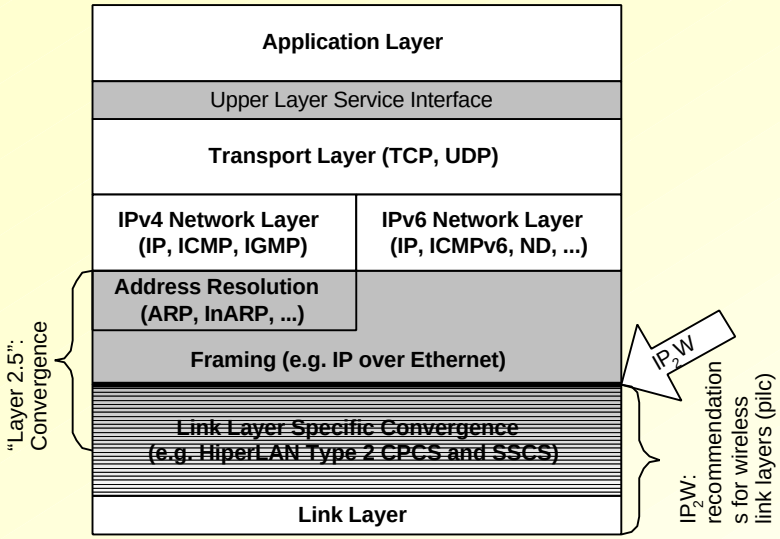
- **Network Transparency**
  - **The "End to End Principle" as applied to Mobile Wireless Networks**
  - **What Goes In, Must Come Out**
- **Network Independence**
  - **Support v4/6 & use any subnetwork type**
- **Obey the Layer Model**
  - **Keep efficiency without the 'stovepipe' solutions of 2/3G**
- **Enable & encourage future evolution**
  - **Means component *independence***
- **Solve only the special problems of Mobile Wireless Access**
  - **Leave the fixed network to the IETF, and contribute mobile wireless parts there**



Key Network Layer Components



Function Split in the Mobile Node



	Interface	
	Control	**Data**
Core	Configuration Management	Error Control
	Address Management	Buffer Management
Optional	QoS Control	QoS Support
	Handover Control	Segmentation & Reassembly
	Idle Mode Support	Header Compression
	Security Management	Multicast

- **Preserve layering**
  - **Allow TCP/IP to be 'wireless/mobile aware'**
  - **Show how link layer can be 'TCP/IP friendly'**
- **Be universal**
  - **IP_2W everywhere**
  - **Convergence link specific**
- **Be efficient**
  - **Link layer can optimise L3 procedures (move detection, address management …)**

Micromobility and Quality of Service

- **Manage fast/smooth handovers within the BAN**
  - **A BAN can be big, and support many radio technologies**
- **Don't enforce a single macromobility protocol**
- **Adapt protocols to BAN requirements**
  - **Common air i/f, transparency, idle mode, scalability…**
- **(Billable) QoS requires negotiation & CAC**
  - **At air interface and probably terrestrial side as well**
  - **Tied to radio resource optimisation & route selection**

⇒ ***If you want QoS, it has to be considered alongside mobility handling within the BAN***

Next Steps

- **IP2W specification and design**
  - **‘Encourage’ radio WP to design convergence function**
- **Determine MN-BAR protocols for μMM & QoS**
- **Adaptation and integration of selected BAN μMM & QoS protocol[s]**
- **Detail security support required in control plane**
  - **Interface to AAA functions, MN-BAN security requirements for signalling**
- **Develop framework for integration with radio resource management**