IPv6 & Beyond-3G Networking

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Motorola Labs

Our IPv6 Position

- **Motorola, a key proponent of the wireless Internet, fully supports IPv6 as an important step towards the delivery of always-on wireless connectivity.**
- **Motorola intends to be a front-runner in introducing IPv6 throughout its product range, including in cellular phones, cellular infrastructure, home networks, automotive applications and private systems.**
- **Motorola will move rapidly to implement IPv6 solutions, including the introduction of dual-stack systems, providing both IPv4 and IPv6 support in order to ensure seamless migration**

Why IPv6 ?

Exhaustion of the IPv4 address space

Temporary IPv4 address space solutions not to last

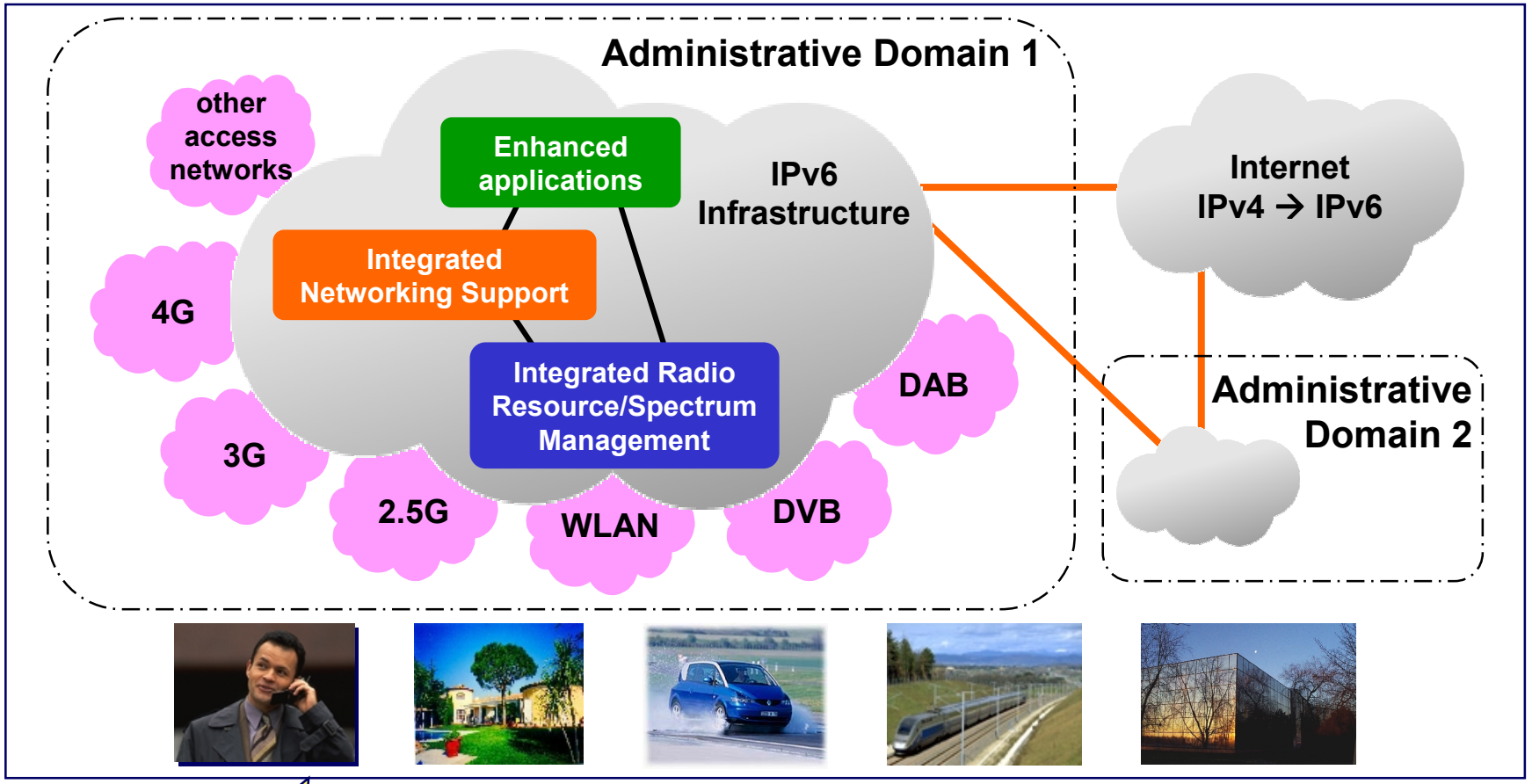
- Classless InterDomain Routing (CIDR)
  - Router change required
- Network Address Translation (NAT)
  - end-to-end security violated
  - always-on not supported

Other IPv6 technical advantages

- Scalable hierarchical address architecture
- Built-in security with IPSec
- QoS-friendly
- Auto-configuration for plug-and-play network access
- Performance gain with more efficient packet processing

IPv6 required for future Mobile Internet

Beyond-3G Architecture



Networking

Secure seamless mobility
For multiparty multimedia communications
For mobile nodes and mobile networks (PAN, LAN)
Between access networks of same and different kinds
Within and between administrative domains
Across personal, home, car and enterprise spaces

Beyond-3G Architecture

Integrated Networking Support

- Enhanced IPv6 networking technologies for integrated support of mobility, QoS, multicast and security, with plug-and-play network management and value-added network services

Integrated Radio Resource/Spectrum Management

- Dynamic allocation and sharing of radio resource and spectrum among hybrid wireless technologies, software radio, etc

Enhanced applications

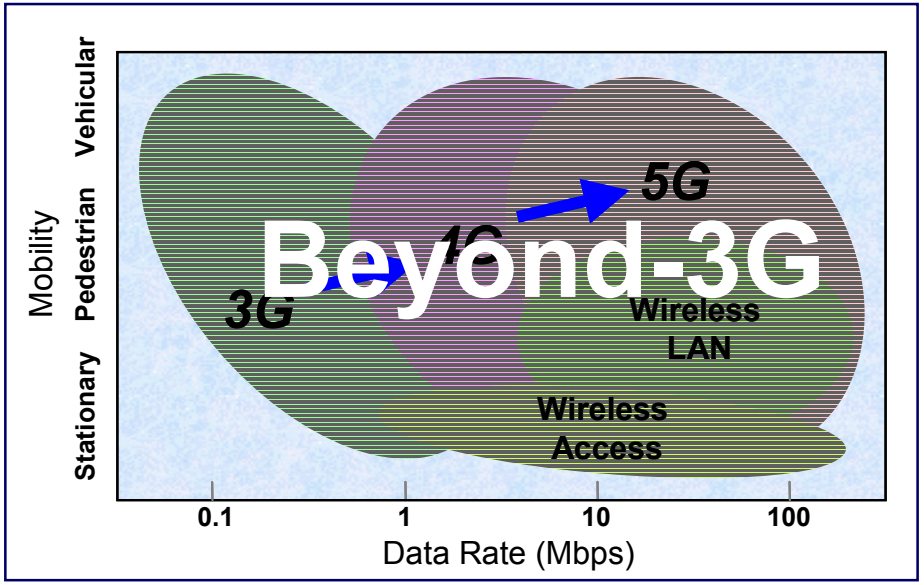
- QoS awareness, location awareness, context awareness, P2P, personalisation, composite radio applications, etc

Enhanced IPv6 networking
As the catalyst to integration of wired/wireless systems and applications
Into a seamless mobile Internet

Context : Paradigm Shift behind Beyond-3G

Traditional approach in wireless evolution	*Co-operative and open approach of the Internet in wireless evolution*
Faster network evolution	
❖ A new generation every 10 years (difficult decision of technology phase-out)	❖ On-demand progressive evolution with integration of new wireless technologies
Lower evolution cost	
❖ Compete with legacy technologies (suffering from initially lower coverage) ❖ Expensive specific equipment for new network infrastructure	❖ Leverage legacy technologies and enhance appeal of new technologies ❖ Generic flexible network infrastructure with cheaper off-the-shelf equipment
Lower operating cost	
❖ Competition of radio spectrum	❖ Optimised sharing of radio spectrum
New business opportunities : easier new technologies introduction and more revenue stream	
❖ Systems are monolithic with specific business models ❖ In search of killer applications to justify new technologies	❖ Neutral networking technologies do not limit business models ❖ Leverage current Internet applications and benefit from new applications at Internet time
Enhanced added-value to user	
❖ User value statement: higher data rate for multimedia applications	❖ User value statement: seamless mobility with multimedia

Beyond-3G Networking



Evolved cellular architecture

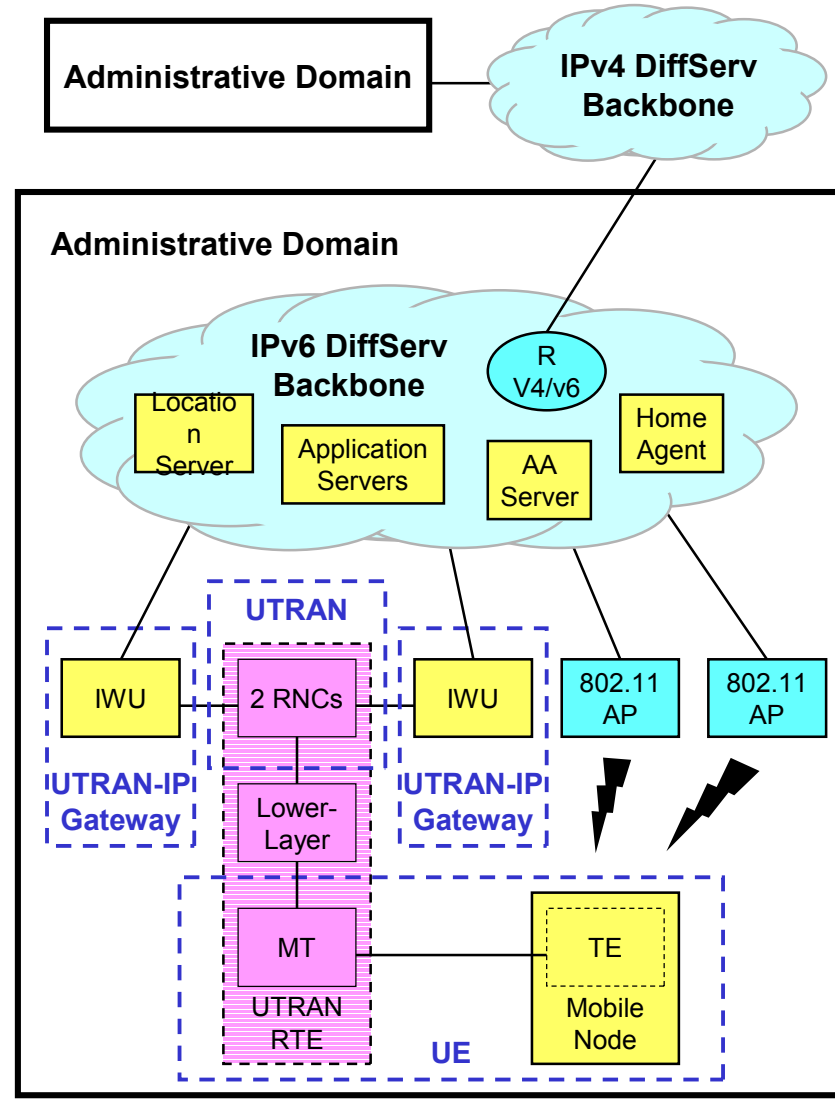
- Base stations directly attached to IPv6 infrastructure

IPv6-based administrative domains for management and billing

Enhanced IPv6 networking

- Secure seamless mobility within and between administrative domains (between same and different systems, mobile- and network-initiated handover, macro- and micro-mobility)
- Network mobility
- Mobility-enabled QoS policy framework
- End-to-end QoS architecture
- Mobility- and QoS-enabled multicast framework
- QoS-enabled transport protocols
- Plug-and-play network management
- Location-based communication and location information management
- IPv4-IPv6 interworking
- Enhanced networking APIs for QoS-, multicast- and location-aware applications
- etc

WINE GLASS (IST-1999-10669)



Objectives

- Mobile-IPv6-integrated NAS signalling for IP session over 3G connection (UTRAN RTE with one RNC)
- Vertical handover of IP session (between UTRAN and WLAN)
- Regional broadcast for applications
- Location information to applications
- Handover procedure between 2 emulated RNCs
- Mobility between 2 administrative domains
- DiffServ QoS infrastructure
- QoS mapping between application QoS API and IP QoS API
- QoS mapping between IP QoS and UTRAN QoS

Moby Dick (IST-2000-25394)

T-Nova

NEC

ETH Eidgenössische Technische Hochschule Zürich

University of Stuttgart

GMD FOKUS

PT

MOTOROLA LABS

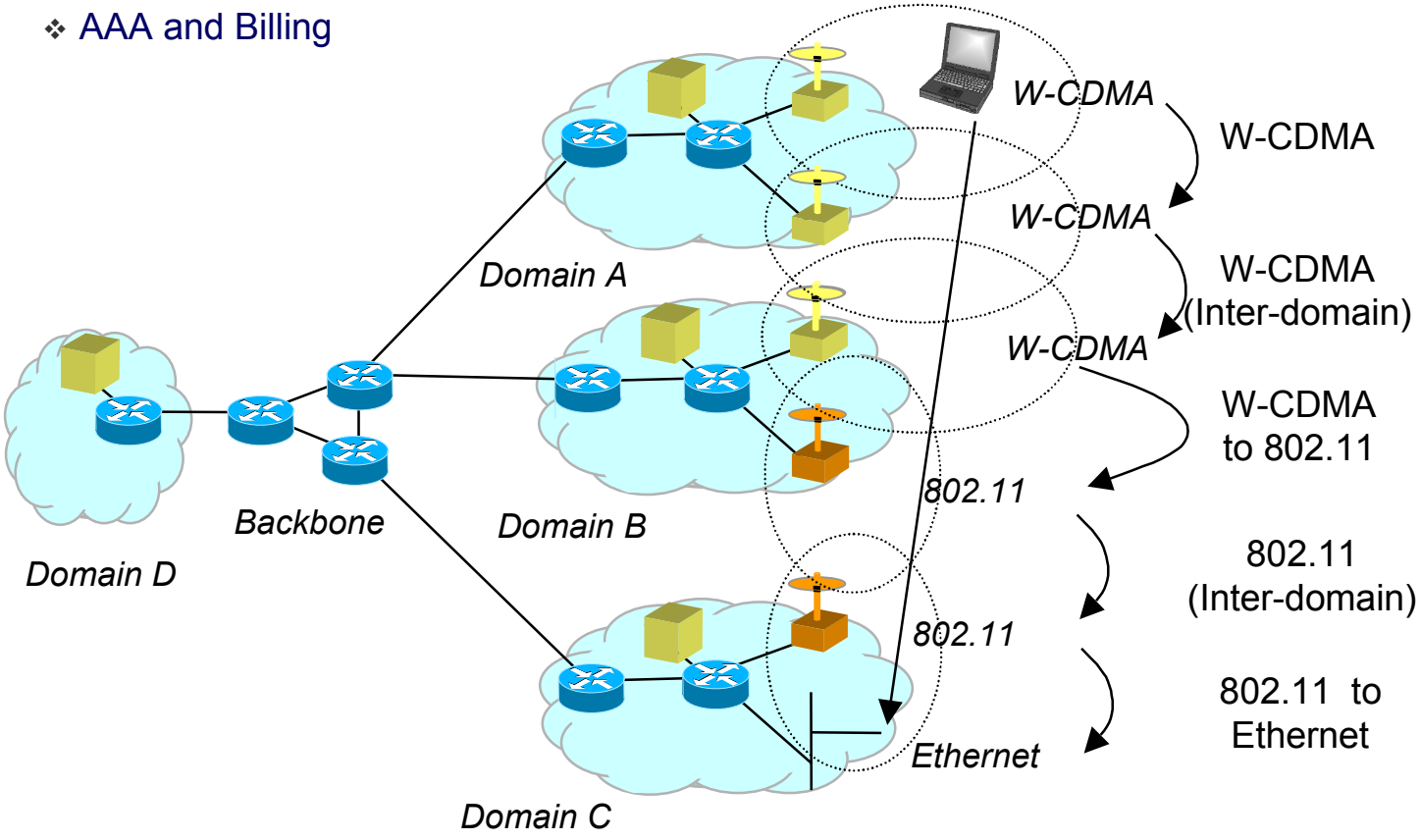
Institut Eurécom

University of Cracow

Objectives

- Radio Gateway (with enhanced Node-B) directly attached to IPv6 infrastructure
- Seamless mobility (within and between systems and administrative domains)
- Mobility-enabled QoS policy framework
- AAA and Billing

ist information society technologies



Conclusion and recommandations

B3G / IPv6 are the largest challenge ever for our industry

- Mobile devices are the most compelling reason for going very rapidly towards IPv6
- IPv6 and Telecom positive co-evolution is a key success factor for both communities

Beyond-3G needs enhancement of IPv6 networking technologies

- Substantial research is needed to develop, experiment, validate, and assess new solutions and their limitations
- IST projects in “Systems Beyond 3G” cluster essential and should be reinforced
- Collaboration with other regional efforts needed (Japan MPHPT new generation mobile communication system)

Current IETF standards still at infancy stage to address the Beyond-3G networking requirements

- QoS issues only recently discussed in mobileip wg, seamoby wg only recently formed for seamless mobility, Inter-administrative-domain mobility still immature
- Focus the standardisation on these issues : need to create a specific work item focusing on B3G IPv6 networking within or outside IETF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Thank You
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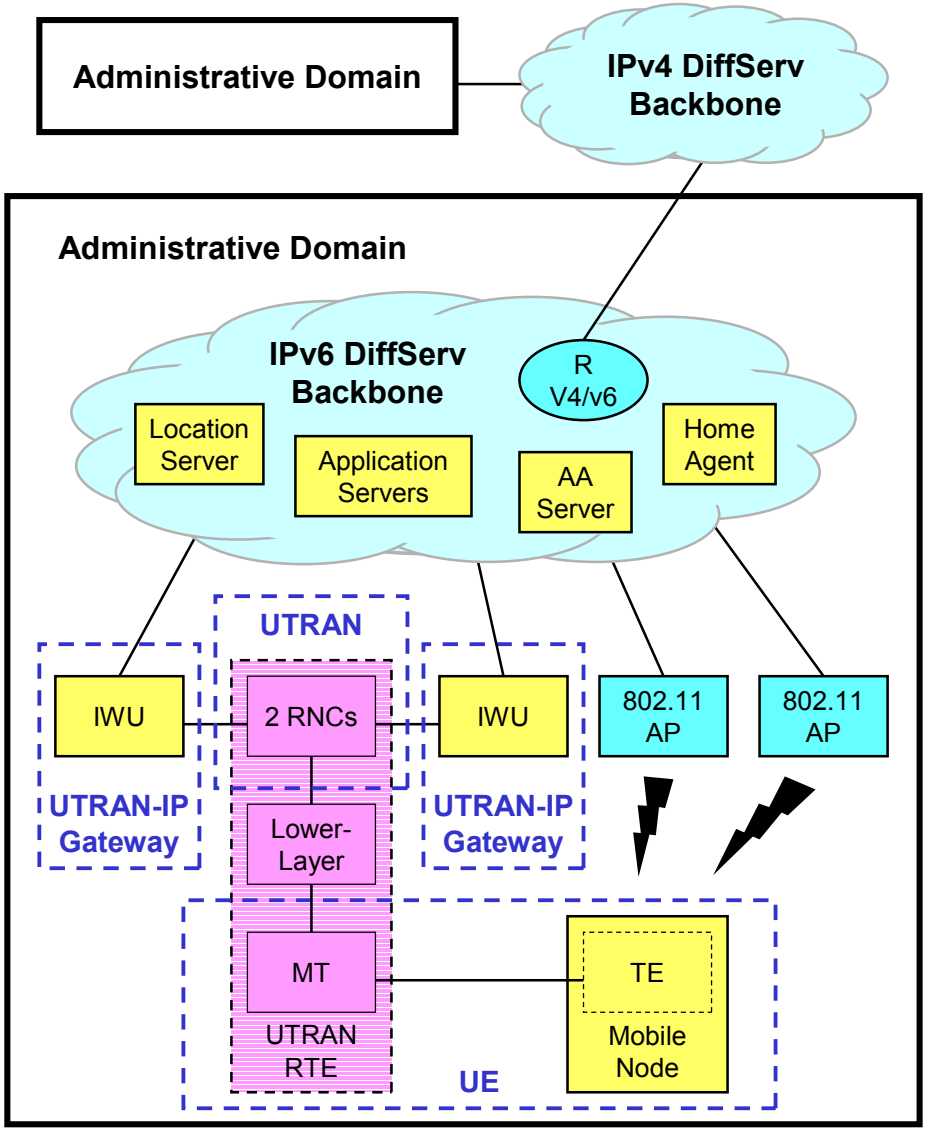
WINE GLASS testbed



Phase-1 testbed (Mar 2001)

- Aironet & Orinoco 802.11b WLANs
- RedHat Linux-PCs with native IPv6 stack and LIVSIX v0.2 (integrated into MIPL)
- One administrative domain with one Home Agent and a dummy AA
- Mobile-IPv6-integrated NAS signalling for IP session over 3G connection (UTRAN RTE with one RNC)
- Vertical handover of IP session (between UTRAN and WLAN)
- Regional broadcast for applications
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Phase-2 testbed (Dec 2001)

- Handover procedure between 2 emulated RNCs
- Mobility between 2 administrative domains
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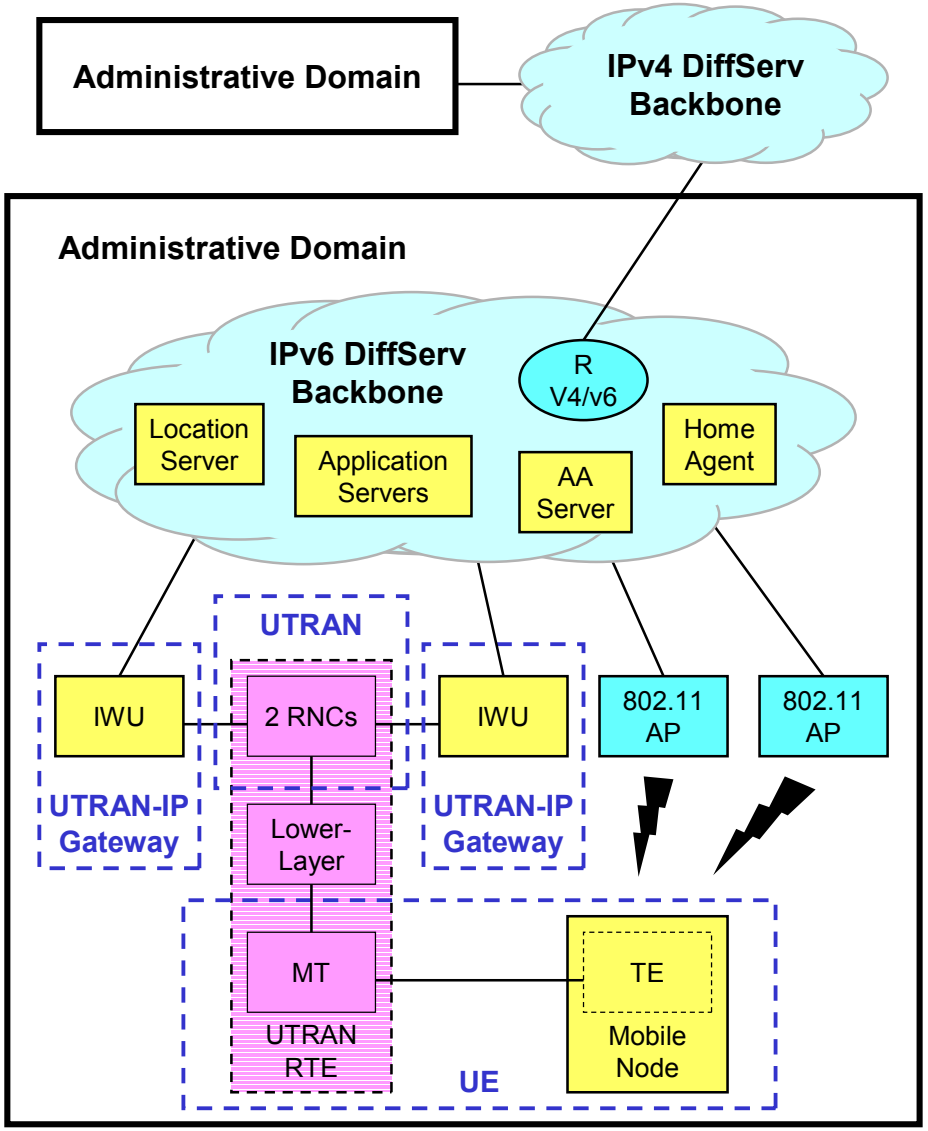
WINE GLASS testbed



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Moby Dick Testbed

Radio Gateway (with enhanced Node-B) directly attached to IPv6 infrastructure

Seamless mobility (within and between systems and administrative domains)

Mobility-enabled QoS policy framework

AAA and Billing