Mobile Network Evolution to NGN

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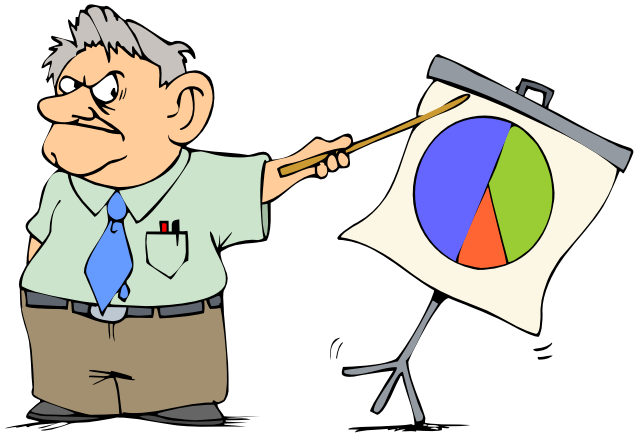
OVERVIEW

- Global standards and NGN architecture
- 3GPP IMS Core-Enabler for Convergence
- Fixed Access to the IMS Core
- CONCLUDE



Mobile-Fixed Convergence

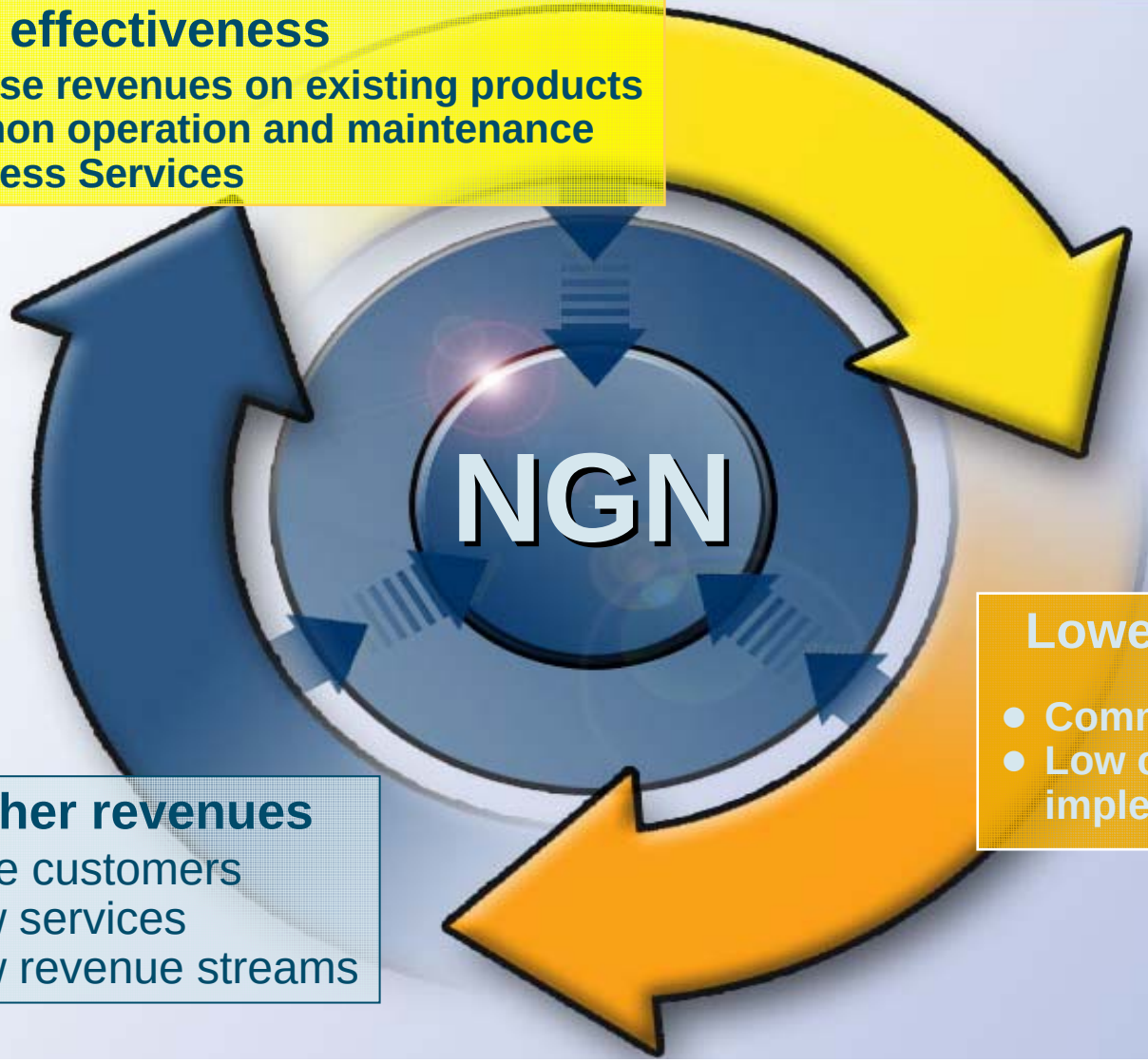
- **With mobile dominating and being the focus of most technological and commercial decisions in our industry**
- **Disruptive technologies cannibalizing revenues and the market demand for ubiquitous services with IT-media to some extend already encapsulated**

  … the *mobile platform* is now the one on which the world will converge
- **The "fixed" telecom industry will need to adapt…**

  … or die

What's in it for operators?

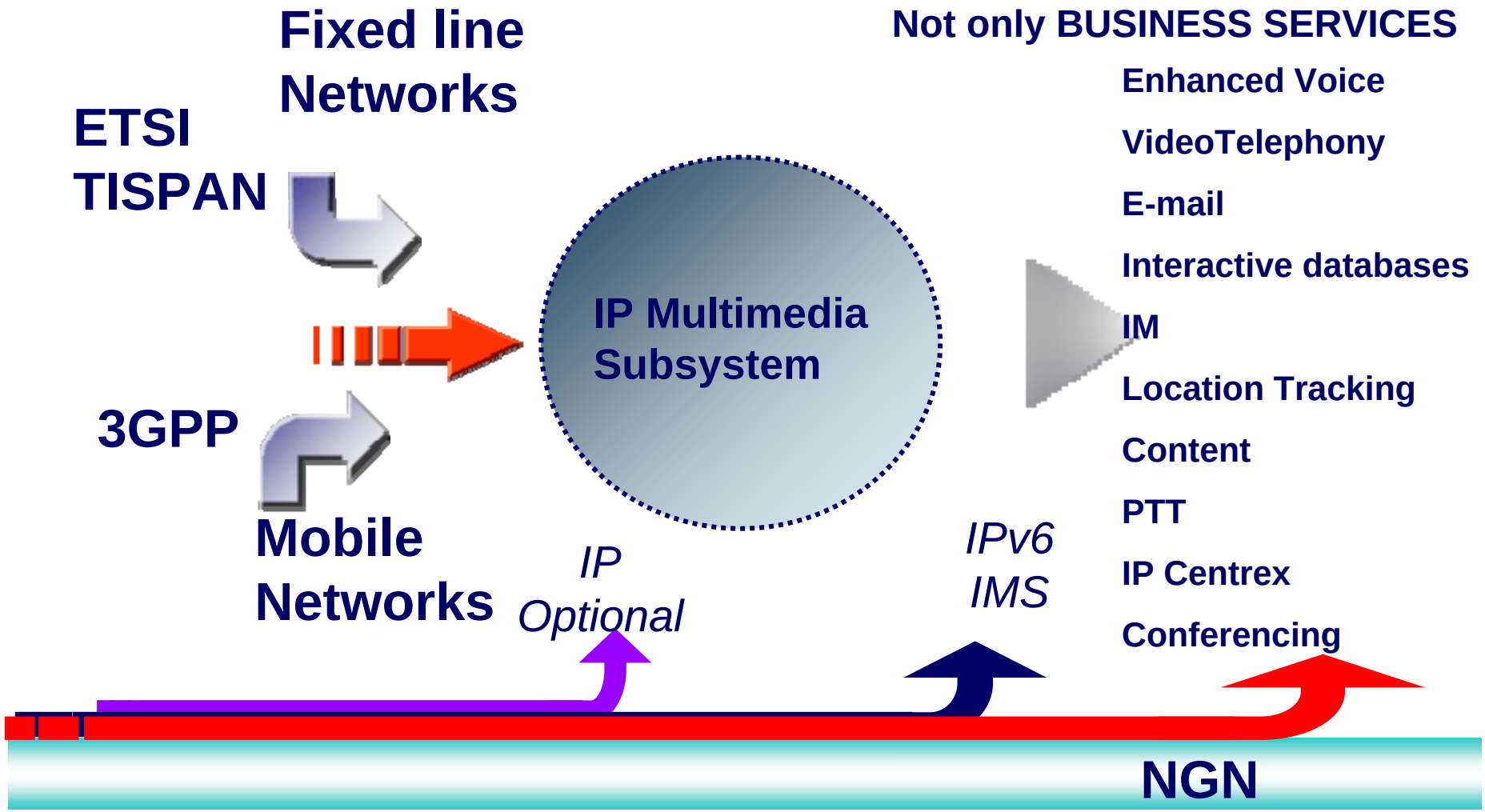
Higher effectiveness
- Increase revenues on existing products
- Common operation and maintenance
- Seamless Services



Lower expenses
- Common infrastructure
- Low costs of service implementation

Higher revenues
- More customers
- New services
- New revenue streams

Service Delivery Platform



IMS - IP Multimedia Subsystem

- **Multimedia Service Platform based upon internet protocols**
  - SIP/SDP
  - IPv6
  - Diameter
  - COPs
- **Independent of Radio Access Technology**
  - 3GPP currently uses WCDMA, GRPS, EGPRS
  - 3GPP2 uses CDMA 2000
- **Independent of underlying IP Transport Technology (IP-CAN)**
  - 3GPP currently uses GPRS for IP mobility
  - 3GPP2 uses Mobile IP for IP mobility

Why IMS in NGN ?

- **IP Multimedia Subsystem generally fulfills the NGN requirements for conversational services**
  - For managed, carrier operated telecom network
  - With Release 6 becomes applicable to a range of access network types (3G RAN, WLAN)
  - IMS access (technology) independence
- **Whole Telecom industry benefit**
  - Will enable simple and effective interworking between Cellular and Wireline
  - Growing IMS market, encouraging greater usage
  - Wider choice of IMS suppliers
  - Market stimulation, decreasing costs (thanks to shared development/deployment costs)

Advantages of IMS

- **Unified handling of all information**
  - Enables peer-to-peer real-time services such as voice and video over the packet-switched domain
  - Combining applications
  - Easy mixing of media voice, video, data?
- **Flexibility in resource utilisation**
  - Mix of network and terminal based resources
  - No binding to specific network service providers
  - Scalable common service control – The ability to manage parallel user services
- **Open Interfaces**
  - Sourcing applications from anywhere
  - Common for all user equipment (fixed / mobile) and all application servers
- **Access Convergence**
  - W-CDMA / CDMA 2000 / xDSL / 802.11x and others

IMS background (1/2)

- **IMS introduced in 3GPP Rel5, and further enhanced in Rel6 and beyond:**
  - IP Multimedia Subsystem for call control based on SIP
  - 3GPP specifies features to fulfil operator requirements, e.g.:
    - QoS control
    - Charging
    - Security
    - Subscription profiles
    - Interworking with other networks (CS/PSTN)

IMS background (2/2)

- **IMS allows operators to have more control on the service level than with GPRS only:**
  - Service level awareness
  - Correlation between the SIP application layer and the transport in PS domain
  - Access to services in correlation with a subscription profile (e.g. basic, silver, gold…)
  - Better control on the packet resources used
- **3GPP IMS Releases:**
  - Release 5: frozen since March 2003
  - Release 6: frozen since December 2004
  - Release 7: target to freeze end 2005

NGN services & capabilities

The Next Generation Network will provide:

- A multi-service, multi-protocol, multi-access, IP based network - secure, reliable and trusted
  - Multi-services: delivered by a common QoS enabled core network.
  - Multi-access: several access networks; fixed and mobile terminals.
  - Built on a managed IP network, with strong emphasis on Security and QoS
- An enabler for Service Providers to offer
  - real-time and non real-time communication services
  - between peers or in a client-server configuration.
- Nomadicity and Mobility
  - of both users and devices
  - intra- and inter-Network Domains, eventually between Fixed and Mobile networks
- Regulatory services
  - Regulatory Services: Emergency, Lawful Interception, Malicious Communication and Anonymous Communication Rejection, Asserted Location Information

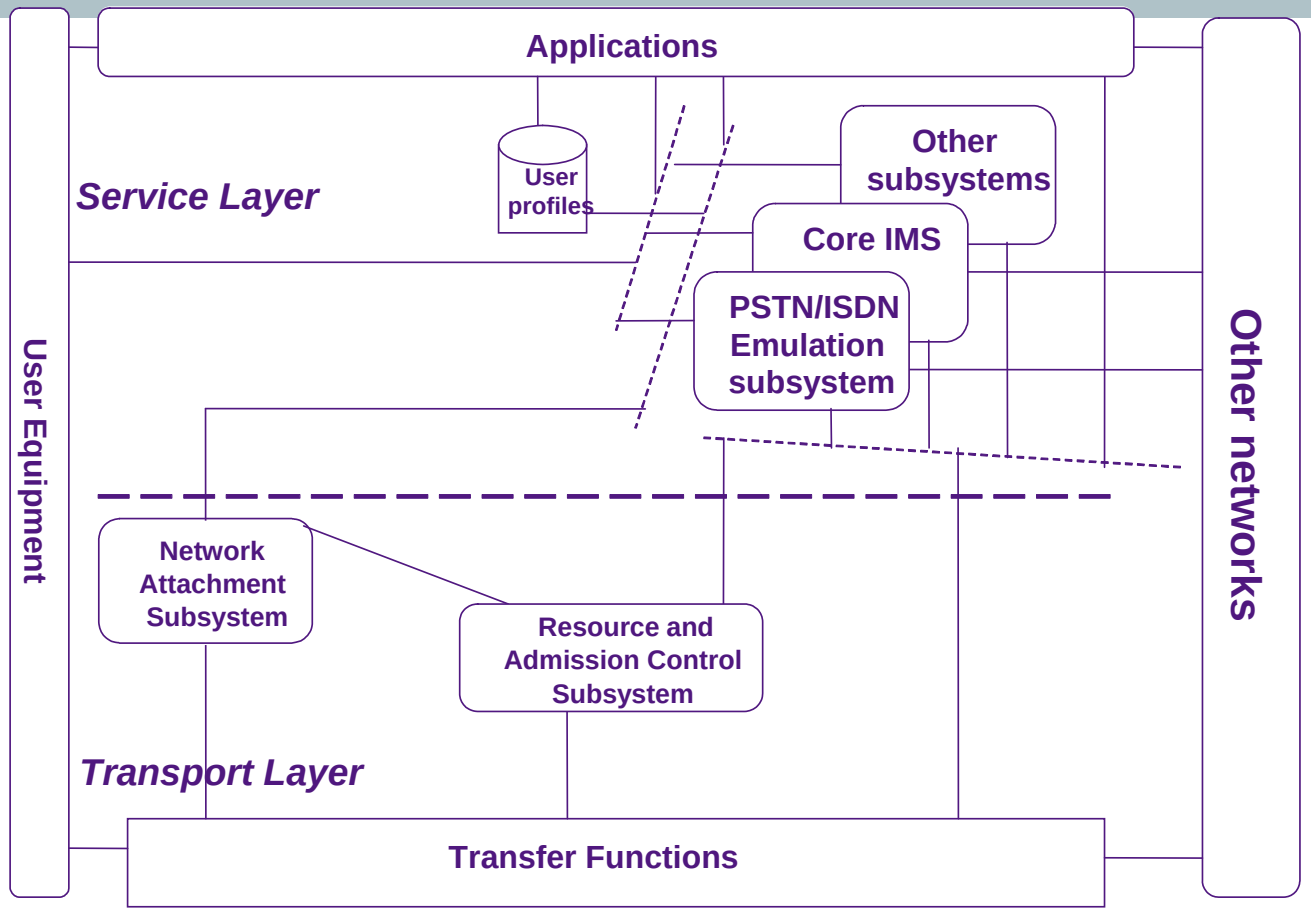
"My communications services" always reachable, everywhere, using any terminal.

NGN architecture and capabilities

- **Use "core" IMS as one of the NGN architecture components**
  - xDSL-based access networks provide access to IMS and other subsystems (e.g.; streaming)
  - xDSL-based access networks as a new type of IP-Connectivity Access Network for the IMS
  - Supporting PSTN/ISDN simulation and multimedia services
- **Complement IMS with other subsystems**
  - A PSTN/ISDN Emulation subsystem specifically tailored to allow TDM equipment replacement
  - Other multimedia subsystems and applications
- **IP connectivity is provided using two subsystems:**
  - Network Attachment Subsystem (NASS)

A focussed and pragmatic approach
To provide multimedia services over IP networks
With emphasis on xDSL

Overall NGN architecture



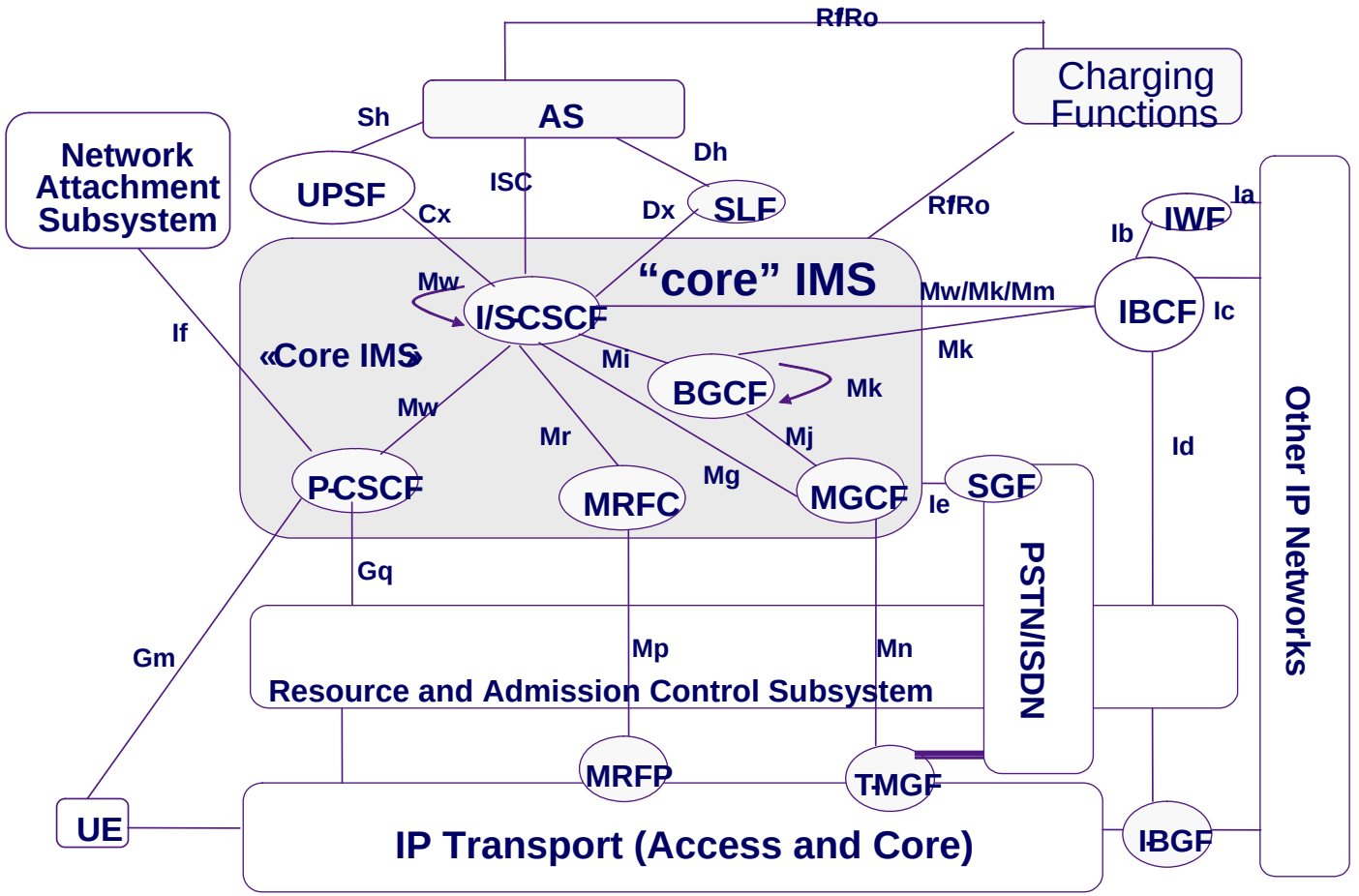
"core" IMS
The NGN subsystem for SIP based conversational services

NGN Impact on IMS Architecture

- **Almost no impact on the IMS functional architecture as such.**
  - The IMS architecture is already largely access independent!
- **Main impacts are on detailed procedures implemented by some of the functional entities, e.g.**
  - P-CSCF procedures have to be augmented with ALG-like capabilities for supporting interactions with NAPT-(PT).
  - Location information has to be inserted in SIP messages by the P-CSCF.

  and on IMS SIP profile.
- **Specific functionalities for supporting IP interconnection are located outside the IMS component.**

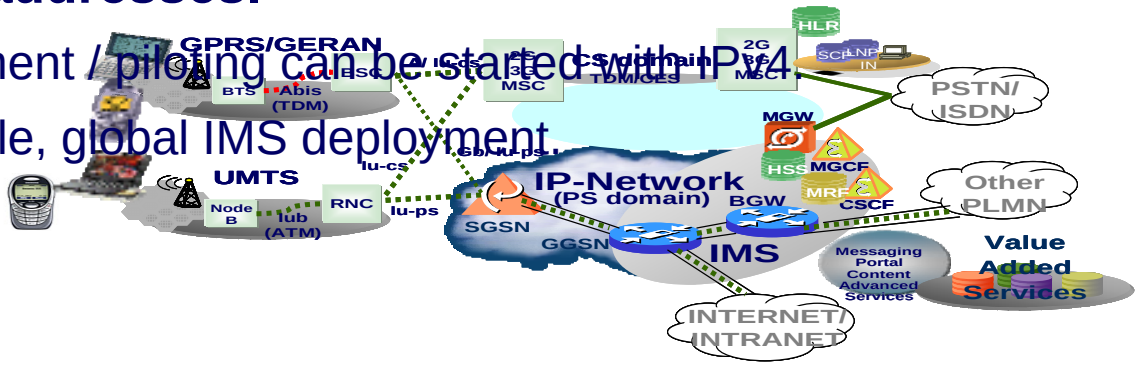
NGN IMS architecture



Roughly ETSI-TISPAN will provide delta endorsements to "core" IMS and add specific functionality for wired access

Peer-2-Peer Services

- **Introduction of SIP-based peer-to-peer services is an important step after current client-server based services.**
- **IP Multimedia Subsystem (IMS) is a service infrastructure based on the use of Session Initiation Protocol (SIP).**
  - End to end IP services
  - Increased potential for service integration
  - Easy adoption and integration of instant messaging, presence and real time conversational services.
- **In order to make peer-to-peer services work between different operators' networks, IPv6 is needed - peer-to-peer services work well only with public IP addresses.**
  - Small scale IMS deployment / piloting can be started with IPv4
  - IPv6 is vital for wider scale, global IMS deployment



IMS adaptations and issues for wired applications

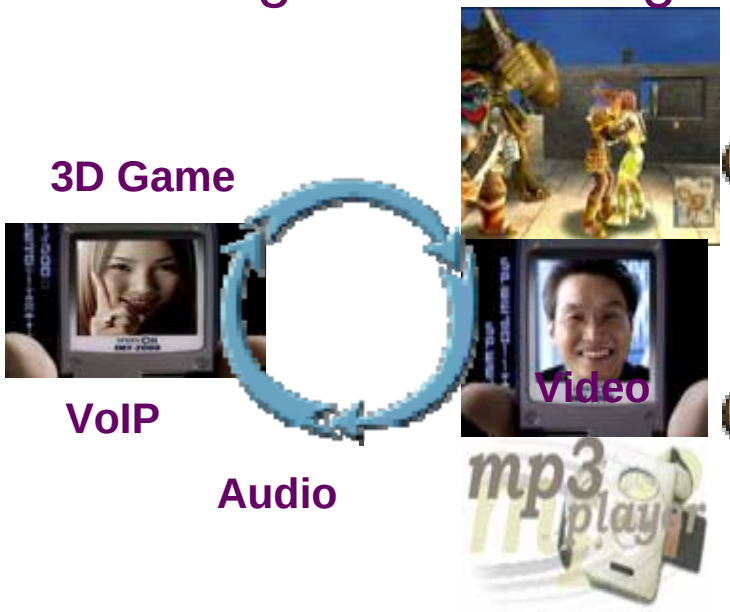
- **TISPAN_NGN has a focussed approach in adapting 3G IMS as a key base component in the NGN architecture**
  - An effective basis to support Nomadicity and Mobility features
  - Consolidating the IMS and Service Platforms access & transport technology independence
  - Adaptations to support xDSL access
  - PSTN/ISDN simulation services
    - CDIV, MWI, OIP/OIR, TIP/TIR, CW/HOLD, ACR, AoC, CCBS, CONF, MCID
  - Presence, Instant Messaging Services for wired terminals
  - Support additional audio and video codecs
  - QoS for real time services
- **Still a number of challenges ahead**
  - Provide packet based emergency calls
  - Security requirements, Identification issues, Authentication, IPv4/6 interworking
  - Solutions shall support the presence of NAT and firewalls in the access network environment.
  - Facilitate charging for a broad spectrum of applications

Current Situation

- An industry desperate for renewed revenue growth.
- Continuing pressure on existing carrier business models with the advent of VoIP and new broadband wireless technologies.
- IPv6 is essentially a catalyst to spark innovation in many different areas, especially in access infrastructures, home networks, user applications – such as VoIP, 3G IMS, Peer-2-Peer gaming, etc.
- RIPE has delegated 500 IPv6 prefixes to European ISPs, which lead the way compared to total world deployment with over 50%. What is not known are their profiles and motivations in deploying IPv6. It is expected that a large majority see IPv6 as a differentiator waiting for the take-up of IPv6.

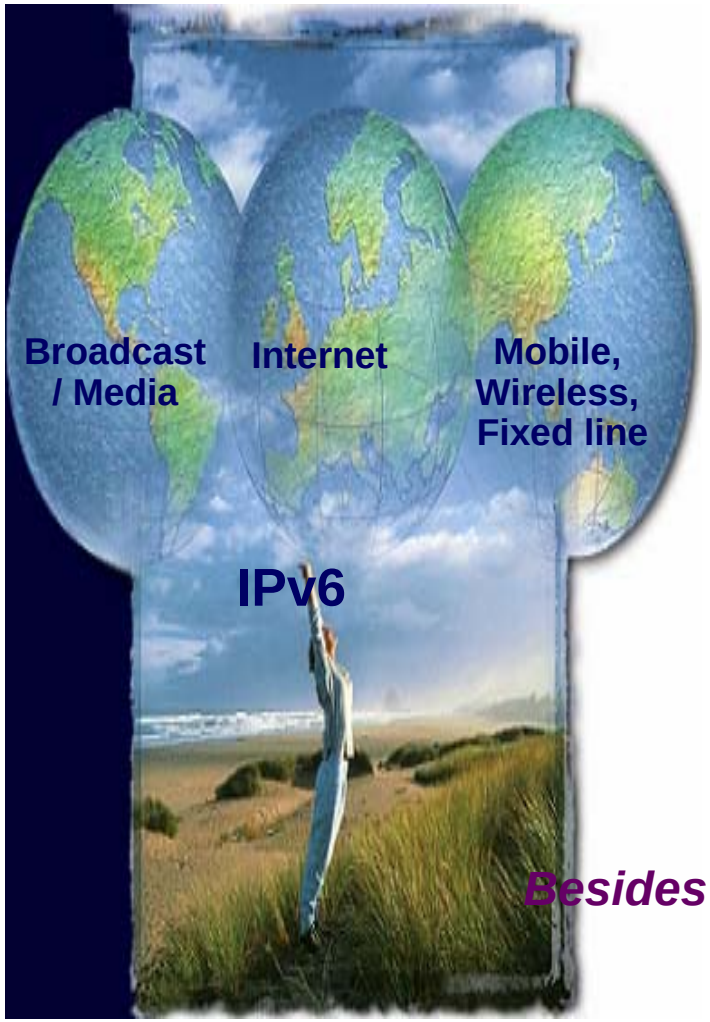
Triple play services driving the need for IPv6

More devices and services are becoming IP-aware . Consequently driving the need for increased network addressing and for “Plug and play” networking.



- Quality of Experience- Call set-up delay, voice latency, channel-zapping, packet loss.
- Security-Dos attack impact on services such as VoIP and IPTV.

Convergence



- Need to support truly Massive Networks
- Autoconfiguration
- Built in Security and QoS
- Designed to Operate as an Independent Protocol
- Multicasting
- Manageability
- Applications

Besides IPv6 Benefits (other than trillions of IP addresses)

Peer-2-VoIP as IPv6 Driver

- Aug 29th 2003: Skype was set up by founders of Kazaa. Promised high quality p2p phone calls over the internet to always on customers (ADSL and cable).
- April 6th 2004: launches PocketSkype for Wi-Fi hotspot access

  Based on e2e VoIP, a good algorithm for voice, PC's with headsets.

- Skype reached 25 million downloads, has 9.5 million users, 500,000+ connected anytime, carried 1.2 billion free minutes!!
- "We have a big ambition with Skype: it is to make it the global telephone company" (Int'l Herald Tribune oct 13th 2003).
  - Skype plans to offer access to PSTN to allow Skype users to call everybody on the telephone network outside the internet for a ¨small¨ fee.
- July 2004: Teleglobe, Level3, iBasis provide Skype PSTN termination. Skypeout reaches two million calls already as of end august 2004.

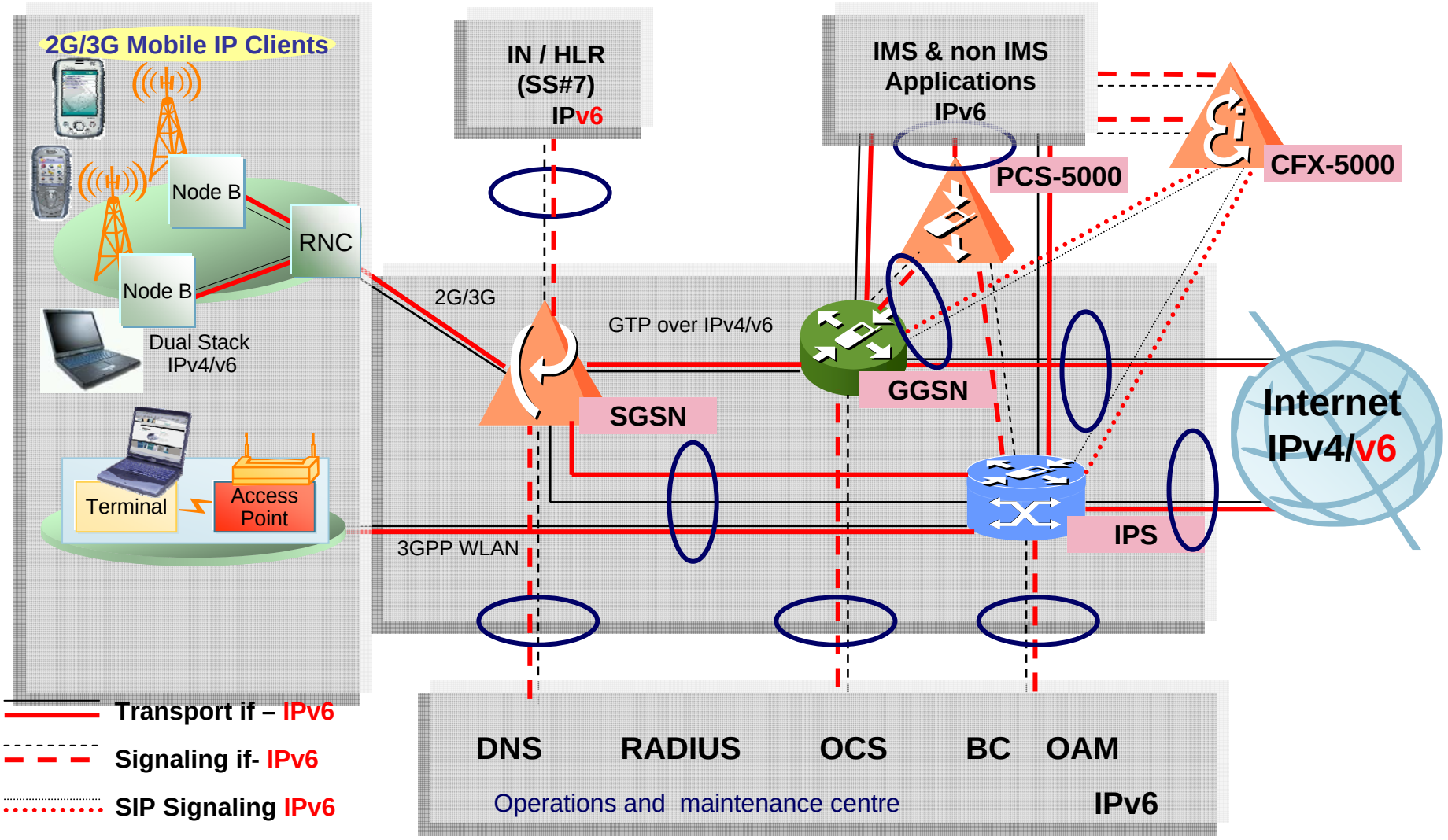
Benefits of Generic NGN IP Access

- **Operator benefits**
  - Charging, resource and admission control provided at the Gateway
  - Provide home based services (e.g., IMS services) without the need to deploy a full IMS infrastructure in the visited network
- **Subscriber benefits**
  - Nomadicity and roaming: access to home services from any location
  - IMS access possible even when access provider and home network do not have a business relationship
- **Mutual benefits**
  - Strong security independent from the access network
  - Support private and/or overlapping address ranges between networks
  - Support IPv4 and IPv6 addresses
  - Application independent NAT traversal
- **Future proof**
  - In future mobility including seamless handover
  - Synergies with I-WLAN and UMA

What will IPv6 Offer?

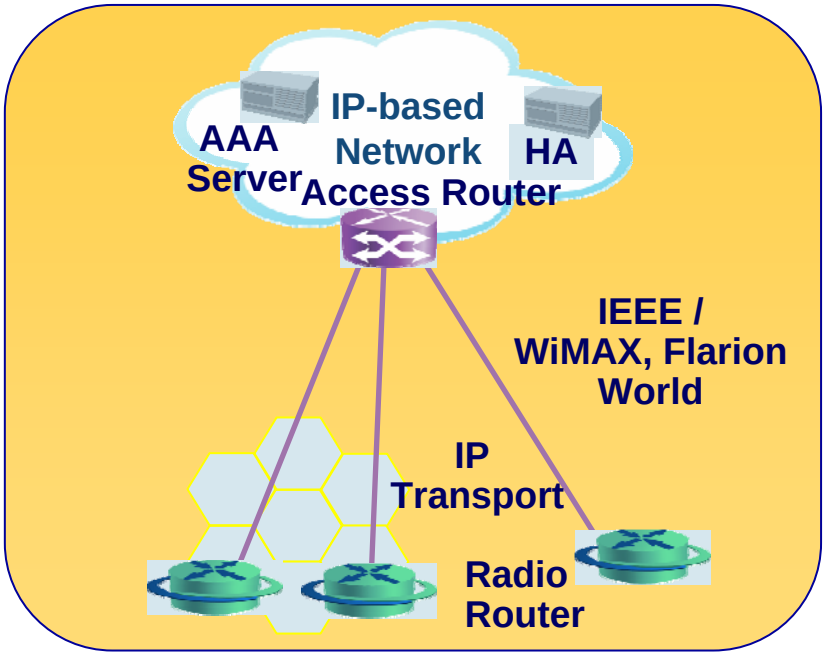
- All IPv6 systems have a globally unique address and reachable on the IPv6 Internet.
- IPv6 will permit new peer-to-peer applications.
- These applications will be secure and Mobile from the beginning without add-ons like IPsec gateway, ALG, additional infrastructure or servers.
- Leverage IP technology to deliver capital & operational efficiency for mobile operators, while enabling revenue growth through new services is worth moving to IPv6.

IPv6 Implementation in the Packet Core



Complementary to 3G/UMTS

Interoperability challenge will be on Application level!!!!



IEEE 802.xx Based:
-WiFi
-WiMAX Forum 802.16Revd/e
-Flash OFMA 802.20

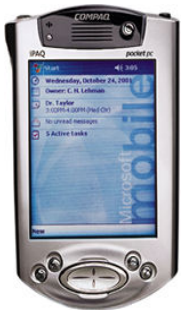
Mobile IPv6 will provide Roming

Common Standards 3GPP/3GPP2
-HSDPA 14Mbps
-HSUPA 14Mbps
Cellular Roaming

Orthogonal Frequency Division Multiplexing (OFDM)
High Speed Download Packet Access (HSDPA)
High Speed Uplink Packet Access (HSUPA)

Mobile IP as IPv6 Driver

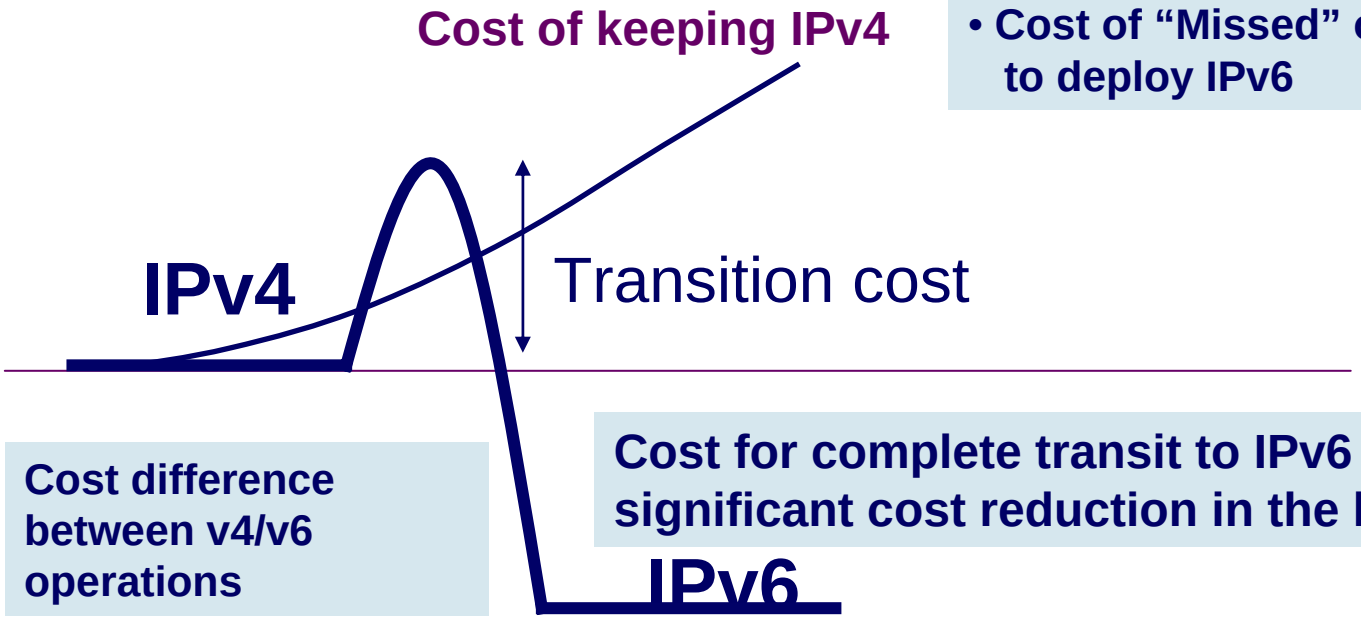
- **Mobile nodes must be able to move from router to router without losing end-to-end connection**
  - A home address to maintain connectivity
  - Many,many care-of address to maintains route-ability
- **Billions of care-of addresses needed in the future**



Analyze IPv6 savings and costs

Cost savings in terms of key IPv6 benefits and Restoration of End-to-End Model

- **Cost in terms of hardware, software, staff Resources**
  - **-Design**
  - **-Transition**
  - **-HW and SW Implementation**
- **Cost of "Missed" opportunities of waiting to deploy IPv6**



Cost difference between v4/v6 operations

Cost for complete transit to IPv6 is a significant cost reduction in the long run

The Ultimate Solution

Focus on providing services that will work and benefit the different Customer segments!

Seeking the raft of all services to drive new revenues

Conclusions

- **With a Telecoms Transition ahead- a strong industry demand**
  - For new generation Multimedia services on xDSL access
  - For preparing replacement of soon becoming obsolescent PSTN
- **For a first Release of specifications by 2005**
  - Giving main standards directions
  - With realistic and implementable solutions
- **ETSI TISPAN proposing an architecture basis consisting of a range of subsystems:**
  - Access network attachment Subsystem, Resource and admission control sub-system
  - Maximizing Fixed and Mobile convergence, through adoption of 3G/UMTS IMS component for support of conversational services
- **TISPAN collaborating with 3GPP to accommodate Wireline access network requirements by IMS**
  - A second workshop with 3GPP in Washington end of March 05
  - To coordinate the IMS evolution and resolve issues
- **TISPAN contributing to ITU-T on a global standard**
  - ITU-T NGN Focus Group, SG4, SG 11, SG 13, SG 19, other SDO

A significant step is being taken to enable the Multimedia Fixed-Mobile Convergence in TISPAN_NGN Release 1