

## Future

Networks & Services

Standards & Regulation

private and public domains

general aspects

(incl. QoS, architectures, interfaces)

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# European main frame conditions



## e.Communications (tentative informal) simplification of definitions

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- **Public:**
  - Available for 3rd people/ users
  
- **e.communication Network:**
  - set of infrastructures/resources supporting conveyance of signals
  
- **e.communication Service:**
  - *conveyance of signals on electronic communications networks*
  
- **Application:**
  - Set of functionalities (requested by the user) influencing the service
  
- **Network Termination Point (NTP, R&TTE and US directives):**
  - *physical point at which a subscriber is provided with access to a public communications network*



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## FwD & USD basic concepts (1-Univ.Serv., neutrality, user) (extracts from FwD)

- o Art2.j. universal service means the minimum set of services, defined in Directive 2002/22/EC (Universal Service Directive), of specified quality which is available to all users regardless of their geographical location and, in the light of specific national conditions, at an affordable price;
- o Art8.1... Member States shall ensure that in carrying out the regulatory tasks specified in this Directive and the Specific Directives, in particular those designed to ensure effective competition, national regulatory authorities take the utmost account of the desirability of making regulations technologically neutral.
- o Art8.2 The national regulatory authorities shall promote competition in the provision of electronic communications networks, electronic communications services and associated facilities and services by inter alia: (a) ensuring that users, including disabled users, derive maximum benefit in terms of choice, price, and quality;



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## FwD & USD basic concepts (2-QoS) (extracts from FwD)

- The word Quality is used 32 times in USD...
- Art1.1. ... The aim is to ensure the availability throughout the Community of good quality publicly available services through effective competition and choice and to deal with circumstances in which the needs of end-users are not satisfactorily met by the market.
- Art1.2... With regard to ensuring provision of universal service within an environment of open and competitive markets, this Directive defines the minimum set of services of specified quality to which all end-users have access, at an affordable price in the light of specific national conditions, without distorting competition....



## What is happening (EU based)

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- EU establish Directives, National Regulators [NRAs] apply them
- Authorities recommend standards but may force their application
  
- Example of 'regulated' service: Universal Service [US]
  - EU give the frame rules, NRAs specify the US
    - US most common item is conversational voice
    - There is a trend to go for Broad-Band access and Services (in discussion)
  
- Example of 'regulated' parameter: QoS
  - Basic general requirement on QoS is transparency,
    - i.e. the user has to be informed about the QoS
    - USD art 22.1: ... Service Providers *to publish comparable, adequate and up-to-date information for end-users on the quality of their services*
    - USD art 22.2: ... NRA *may specify (...) the QoS parameters to be measured, and (...) information to be published, in order to ensure (...) comparable and user-friendly information.*
  - Parameters considered do not cover explicitly transmission performance
    - see EG 201 769, recommended by EU authorities
  - Some NRA specify minimum QoS level (e.g. MOS 3.6) for the US

## Some implications (1- requirements/ CoS)

- **Infrastructures** need to be optimized to multiple classes/types of services
  - to ensure users non-discriminatory access to all type of services and all service providers, it is not enough to optimize infrastructures to a single class of services [CoS]
  - Network performance objectives (Y.1541) may be used to define classes of services [CoS]; further details may determine subclasses
  - A CoS represents a group of services requiring from the infrastructure comparable performances and characteristics; the CoS is not associated to a specific service
  - interfaces between networks and services (not only NNI) need to be specified; if the 'call' crosses successive NNIs the QoS may decrease
  
- **Open standards** for relevant interfaces covering QoS/ CoS are needed,
  - ... but interfaces are no longer only the physical interfaces used earlier...
  - i.e. in the IP world the headers of the packets need to include relevant information for the routers to operate correctly



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## Some implications (2- private - public)

- Private (home or business) and public domains should be seen in different contexts,
  - e.g. a public service provider cannot a priori assume responsibilities or manage data from private users (each person localization, message contents, personal data, etc), unless a clear delegation of powers is established
  - i.e. UNI (NTP) interfaces (of different type) need to be specified and QoS/ CoS relevant parameters identified/ quantified for specific services
  
- Public NO and SP need to understand their liability/ responsibility,
  - i.e. Network and Service definitions need to be clear/ clarified
  - and physical and functional interfaces (at least the most common) need to be specified in technical terms



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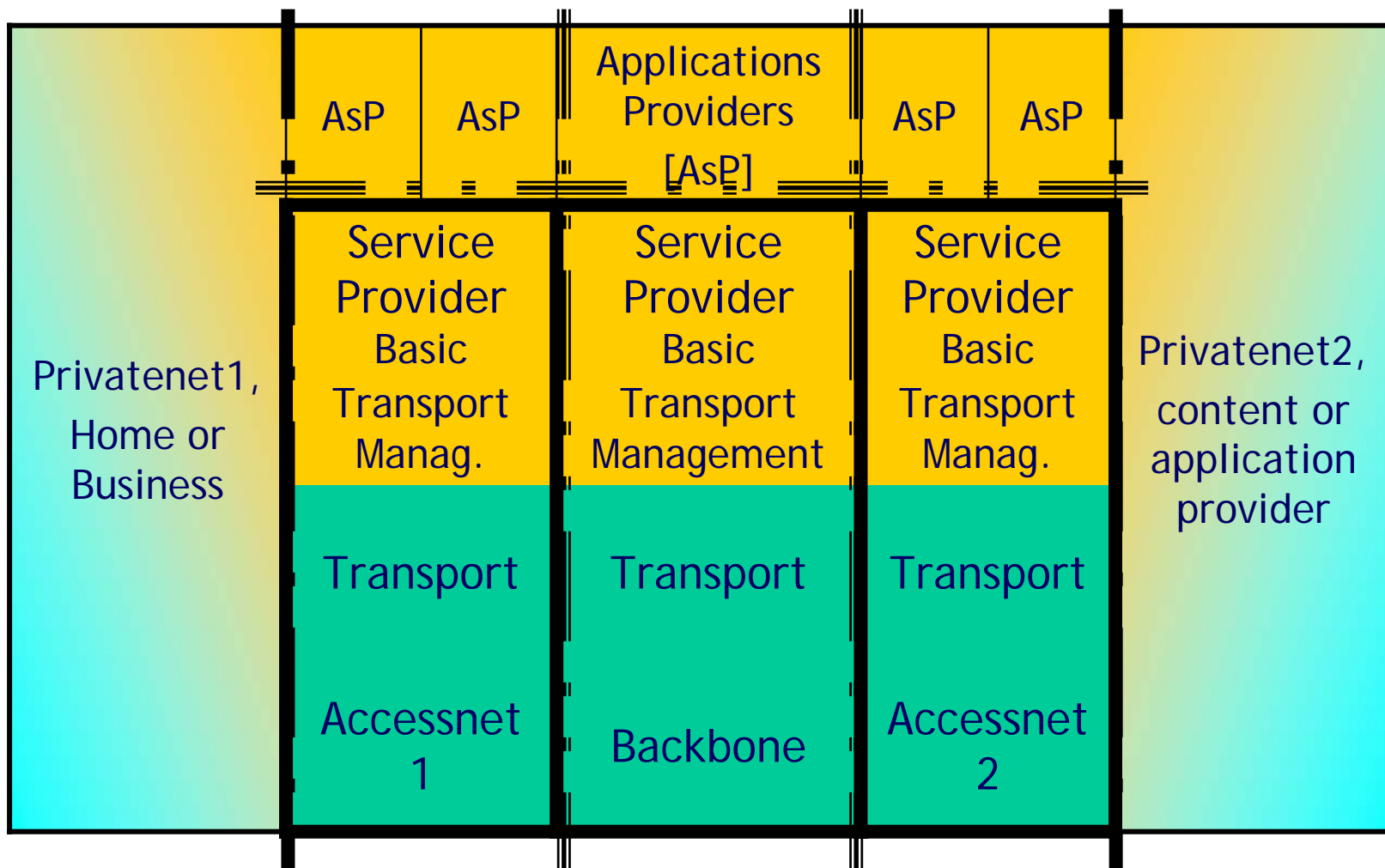
# Visions & Trends

- General consensus for **Future Networks [FN]** (NGN & others)
  - Infrastructures & Services are different and independent issues
  - **Services should focus in user's needs and be offered independently from the technology/infrastructure**
  - **Infrastructures should optimise information flow (max. flow/class of service) and be open to all type of services**
  - Nearly all FN are based on IP and internet concepts
  - Seamless evolution from PSTN/ ISDN/ GSM to FN is a goal
  
- 2 ways of operation the Network Operator [NO]
  - fully controls the net (NGN [Next Gen. Net]/ client server)
  - offers the control (at which level?) to (NGI [Next Gen. Internet]/ Data Aware Nets):
    - Himself or
    - Service Providers [SP] or
    - User [U] (P2P)

# NGN/Client server solution

## Main modules and border lines

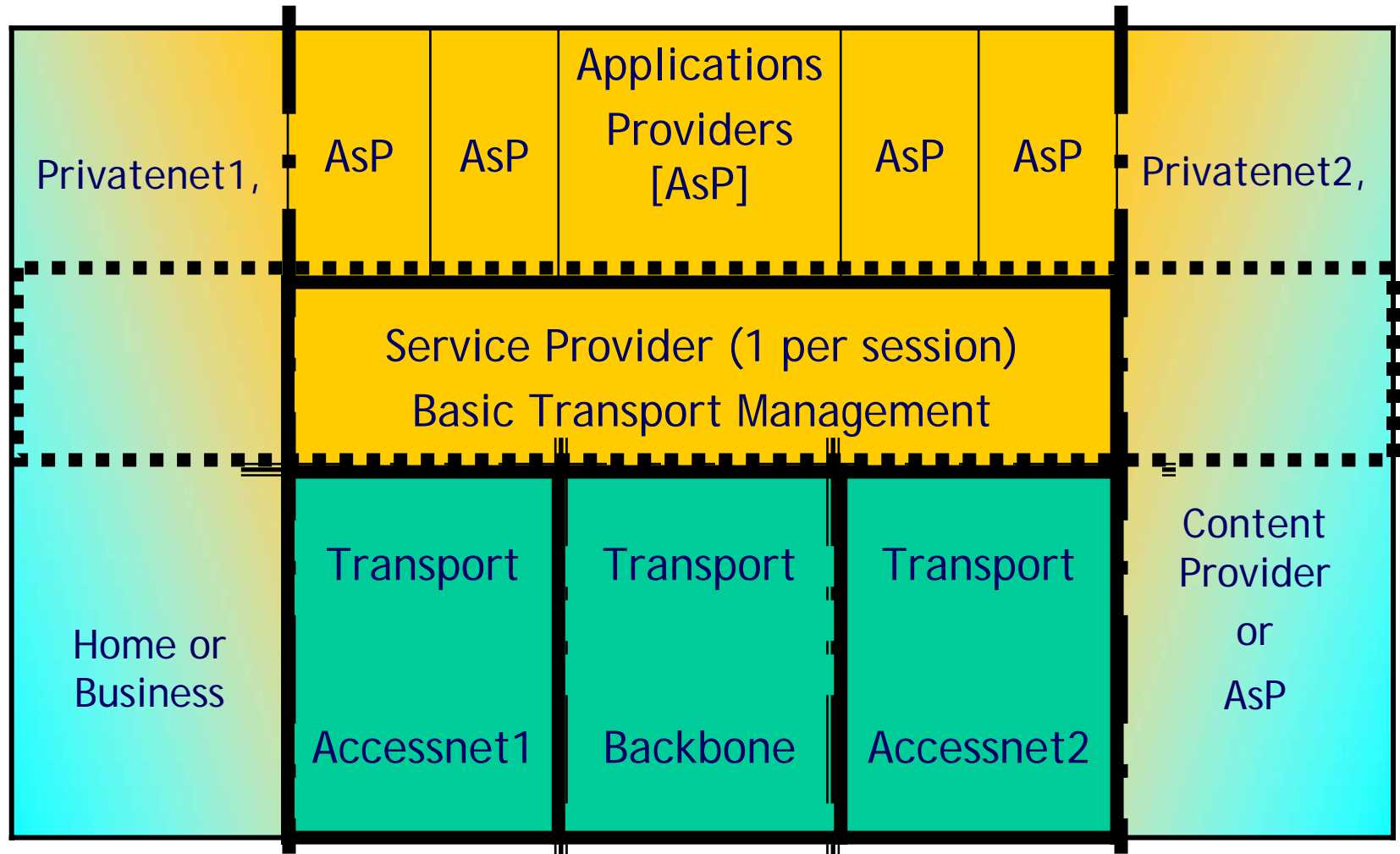
### NTP and PoI



# NGI, P2P, DAN solution (user control)

## Main modules and border lines

### NTP and PoI





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## Trend: private needs (home&business) determine evolution

- o Internet was born to 'inter-net' universities
- o Growing intelligence in a widened range of consumer products leads to
  - home&business 'intra'-net intensification (within private domain)
  - and 'inter-net' the Home&Business nets via public nets
  - In this case NGI may be the best solution, the main role of the public net is transport
- o For legacy cases or no network management power in the private domain
  - NGN with centralized intelligence may be the best solution
- o To ensure acceptable quality (and success) to applications flowing,
  - the 'inter-neting' should be at an acceptable quality level
  - i.e. networks and services shall offer reasonable quality connections
- o Modularity is a must, standardization is a tool!



## Private & Public from physical to higher layers

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- While in the private domain
  - the person in charge of the network up to the applications is a single one,
- in the public domain, with the increase of the range of services offered,
  - there may be different entities for networks, services and applications
- I.e. in the public domain there is a higher risk of conflict of interests
  
- Consumer networks, installations & cabling ('lower' layers)
  - need to support Home/B2B applications with lower layer standards
  - Covering new buildings, renewal and do-it-yourself aspects
  - For all types of installations (coax, twisted pair, fiber, radio, etc)
  
- NGN@Home(&Business) ('higher' layers)
  - do not require the control of a SP or a NO but
    - may offer the control (upon authorization of the user) to external devices
  - base on intelligent terminals,
    - assign separate functions to different (remote or local) units
  - aim primarily Inter-working between/among HomeNets/ Business nets/ SPs
    - Use normally Public Networks on a peer to peer (P2P) basis



## Summary of the strategic borderlines NTP & PoI reference points

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- Some relevant definitions to be found in the beginning of this document
- Defining borderlines is essential to determine liability/ responsibility
  - E.g. the impairments introduced by each player in the overall QoS
- **NTP: Network Termination Point**
- NTP (more regulatory sense) or UNI (more technical sense)
  - Splitting private and public domain
  - Difficult to define... 1 NTP/ communication layer?...
- **PoI: Point of Interconnection**
- PoI: NNI (net-net), SNI (service-net), ASI (application-service)
  - Linking/ splitting people (structures) offering services for 3rd people



# Main entities, modules and definitions Needing clarification

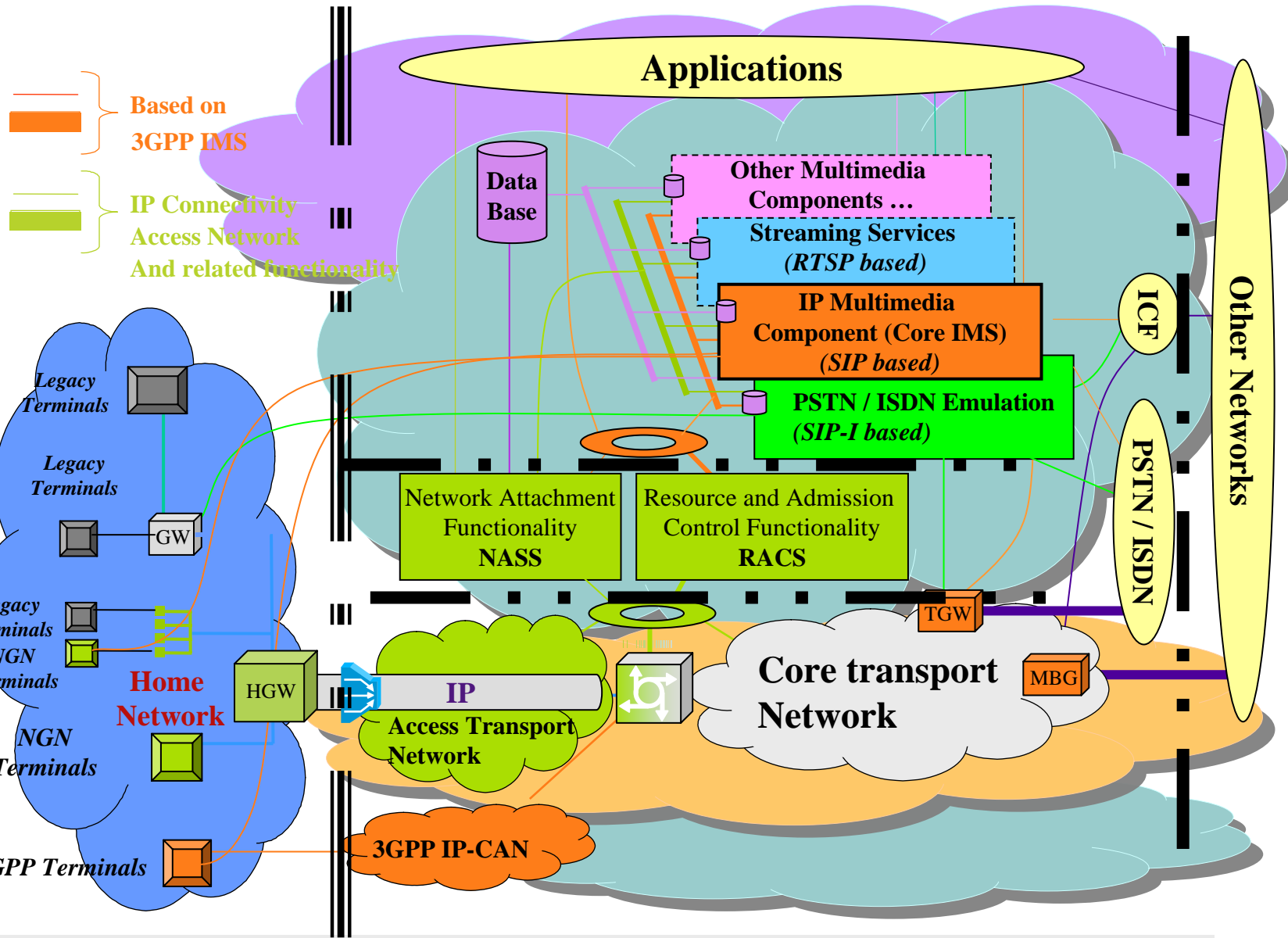
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- What is a:
  - NO (Network Operator)
  - SP (Service Provider)
  - ApP (Applications Provider)
  - CP (Content Provider)
  - AxP (Access Provider = NO? Controlling or not transmission?)... do we need this definition?
  
- Should typical/ preferred positions for borderlines be identified &
  - Recommended, allowing partners to decide?
  - Imposed, forcing solutions... always? When?
  
- Is there a particular protocol used as a borderline between NO and SP?  
And NO-AxP? And SP-ApP?
  - Recommended allowing partners to decide
  - Imposed, forcing solutions... always? When?



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# NTP & PoI: where are they?



ES 283 002: HGW is not TE, belongs to SP (legacy terminals)  
NTP should be on the other side of HGW (??)



# TCP/IP-layers model, where is PoI?

TCP/IP-Layers	OSI-Layers	Examples
Application & service	5-7	<u>HTTP</u>
Transport	4	<u>TCP</u>
Internet	3	<u>IPv4, IPv6</u>
Network	1-2	<u>Ethernet</u>

What needs to be assessed  
by the authorities

Input from the industry welcome



## Summary of open questions, possible regulatory impact

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- o more & more intelligent Private Home&business nets
  - clever switches, PC powered, wider applications range
- o Requirements on the NO and SP's are not enough(!??)
- o Is the liability of a Home/ business owner clear?
- o Are measures/ rules enough to ensure general legal principles?
- o Does a specific type of network architecture help?
  - NGN, client-server?
  - NGI, DAN/P2P, Peer-to-peer?
- o To establish a 'connection' is it enough for the Home device to send
  - Partner Address, Class of Service and Transmission Rate?



## What are the overall essential requirements?

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- offer **universal** access to all addresses, services and applications
  - **except** those barred by the Authority under specific justification
  - Including info to the user, emergency calls, user id and localization, routing id
  
- appropriate **QoS** (non SP-discriminated) / class of service connections,
  - **except** in disaster or exceptional justifiable situations where the NO may have to assume full control of the net
  
- **secure/** data protected connections,
  - **except** in Lawful Interception cases under specific justification
  
- depending of NO and SP definitions,
  - the requirements apply to one, the other or both...
  - And Access Providers (AxP) do we need to define???
  
- & how do the requirements **apply to private network owners?**

- o Where are the essential interfaces:
  - NTP: where ends the private domain (including liability) and starts the public domain?
  - Pol: which are the typical interfaces and where are they: see cases (SP-SP) (NO-SP) (NO-NO)
  - Where is the Boarder line between NO and SP? Is the NO only the owner of the infrastructure?
  - Is the control of the infrastructure (commands informing the address, the class of service, etc...) already a SP issue or still an NO matter?
  - ...

...

i.e.

the starting points

...

What will be the requirements  
on services, architecture(s), system(s), essential interfaces  
of the Future Networks  
seen from Regulatory Bodies?

- o 2 main trends, may co-exist and converge later
- o No split NO-SP, i.e. no interconnection interface between service and network layers will exist
  - NGN (ETSI-TISPAN/ ITU-T SG13)
  - IPCablecom2 (ITU-T SG9) & Broadcast
- o A split NO-SP, i.e an interface for interconnection exists between service and network layers
  - NGI, DAN, Internet P2P, based on IPV4, enhanced IPv6



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## The way ahead

- Legal and technical certainty is 'a must'
  
- Specify/ define in clear/ easy terms
  - Essential Requirements [ER]
  - Entities (overall modules, interfaces, players)
  - Which ER is primarily relevant to each entity
  
- Independent of technologies & architectures  
legal provisions will have to apply



## The overall entities, modules and players

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private domain (user/home/business net)	[U]
public net/ infrastructure/ transport	[NO]
public service server/ net controlling unit	[SP]
ev. access server / access provider (if AxP $\neq$ NO/SP)	[AxP]
applications server	[ApP]
contents generating unit	[CP]



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## Level of responsibility per entity

(DRAFT to be discussed: every field needs a study)

ER	1	2	3	4	5	6	7	8	...
e.g.	sec	LI	All 2 all	QoS	U Id	U local	Rout e Id	DRM	
U		4		4	1	1	3	1	
NO	3	3	2	3	4	4			
AxP	2	2	1	2	3	3	1		
SP	1	1	3	1	2	2	2		
ApP				4				3	
CP								2	

Thank you  
for  
your attention

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