



World Class Standards

Overview of ETSI TISPAN IPTV

ETSI TISPAN

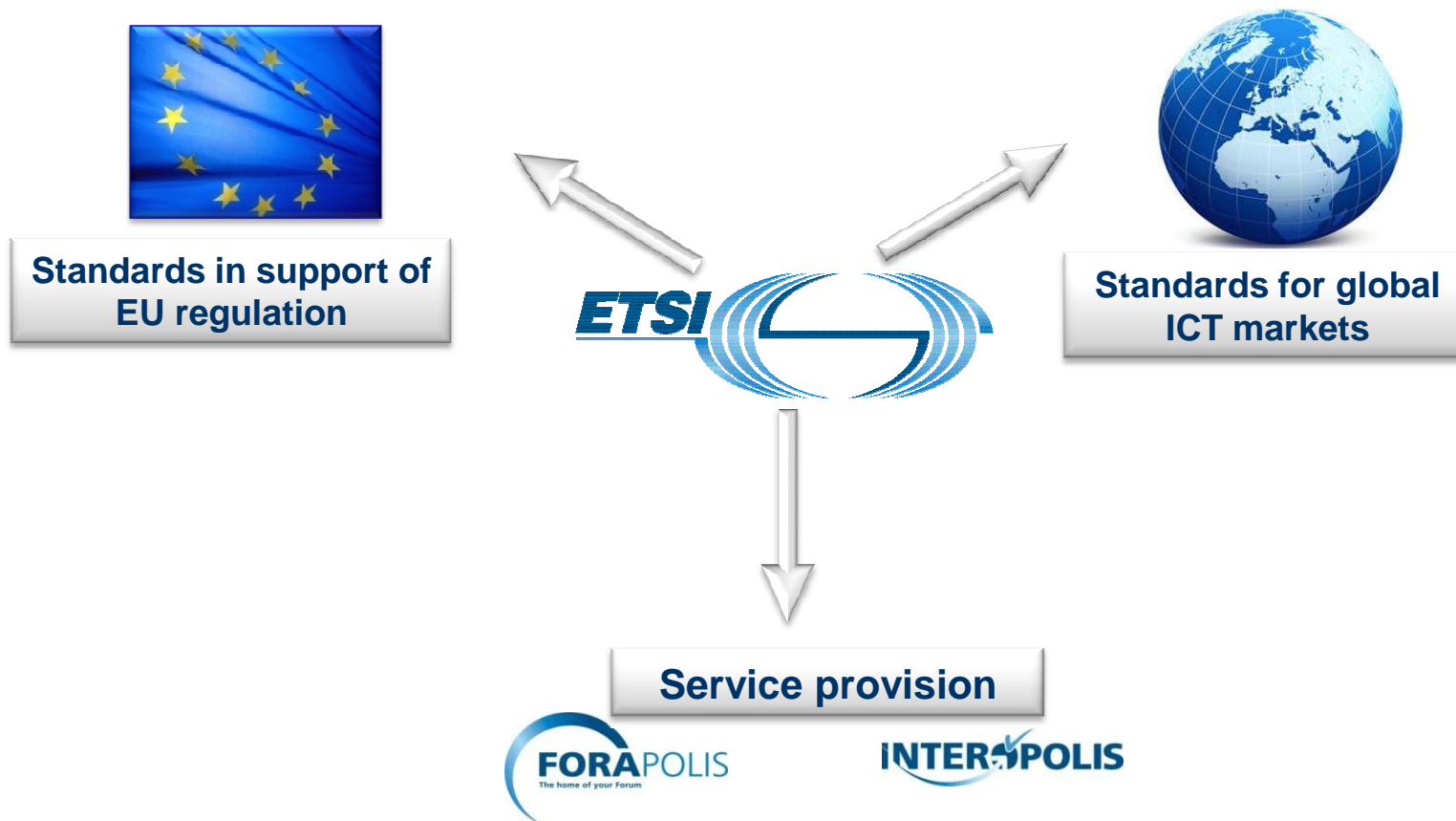
February 2010



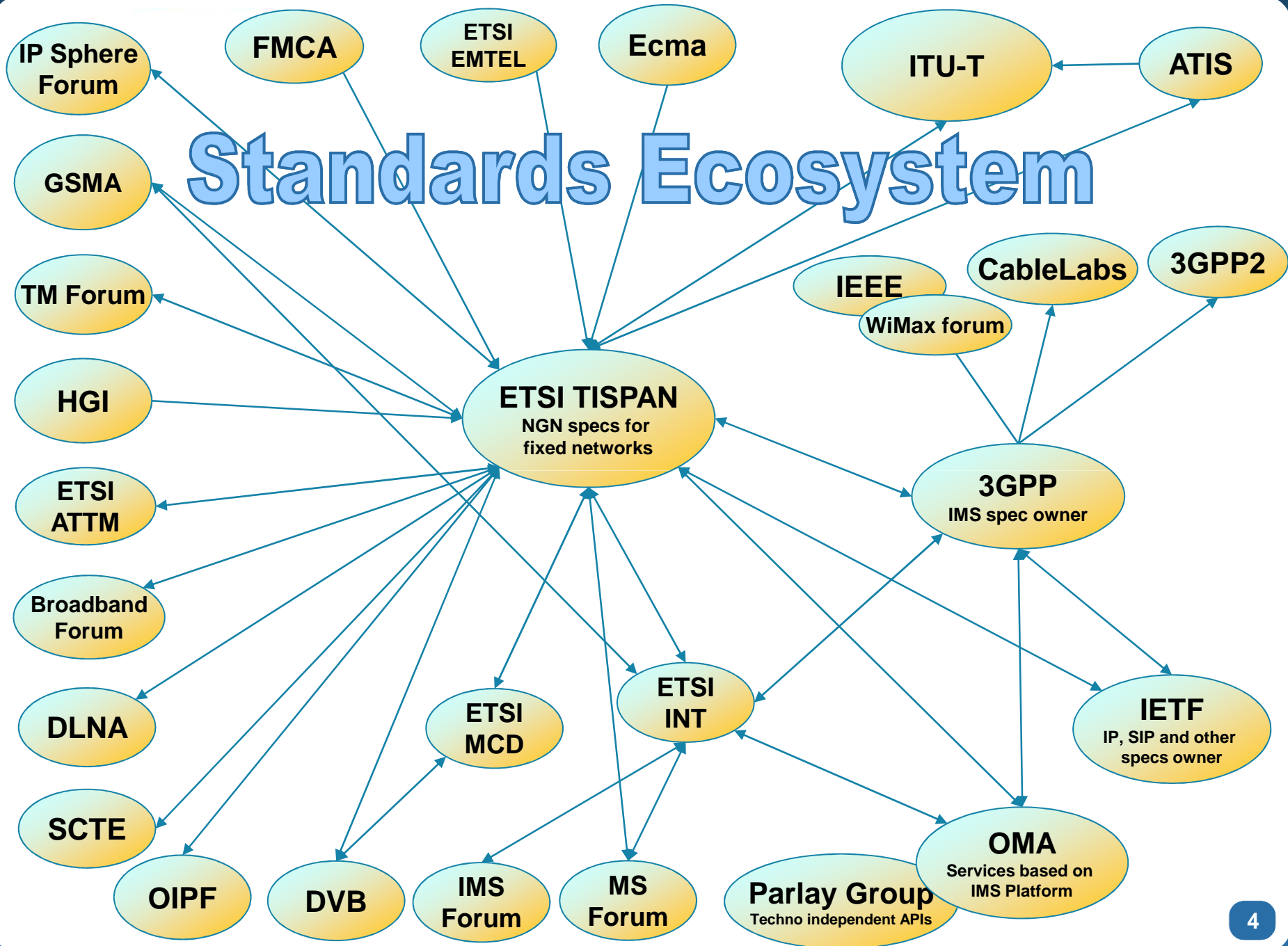
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ROLE OF ETSI AND TISPAN IN IPTV STANDARDIZATION

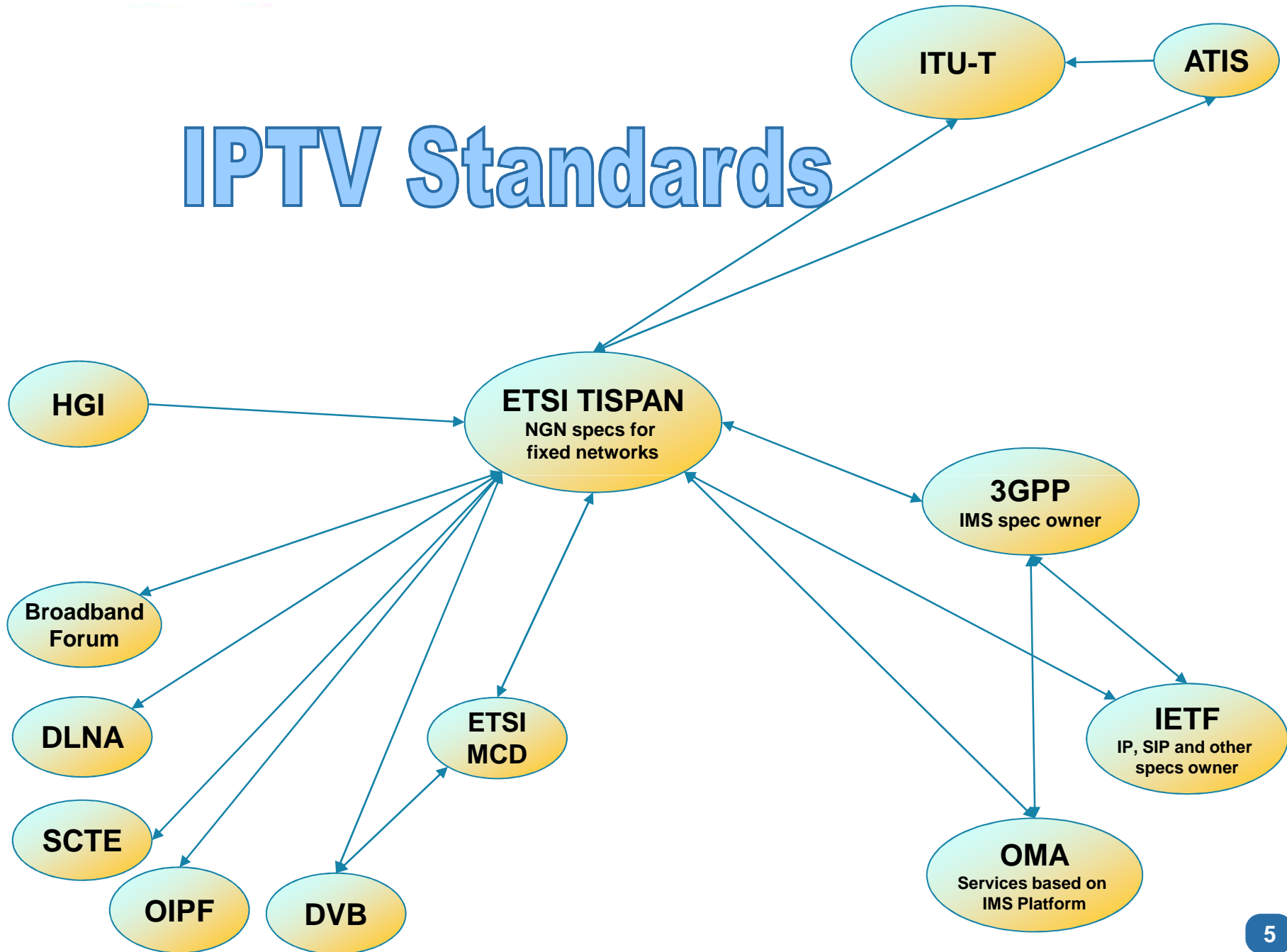
The three dimensions of ETSI



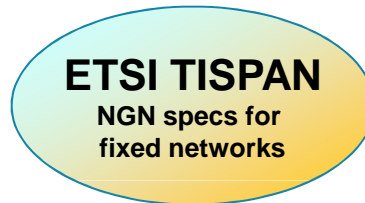
Standards Ecosystem



IPTV Standards



Testing Ecosystem



NGN Network Testing:

- Technical specifications
- Interoperability events

IPTV interoperability events
Working on collaboration
with TISPAN for IPTV
plugtest event

IMS Network Testing:

- Technical specifications
- Interoperability events



IMS and NGN services
interoperability verification
and certification



Why TISPAN Standards?

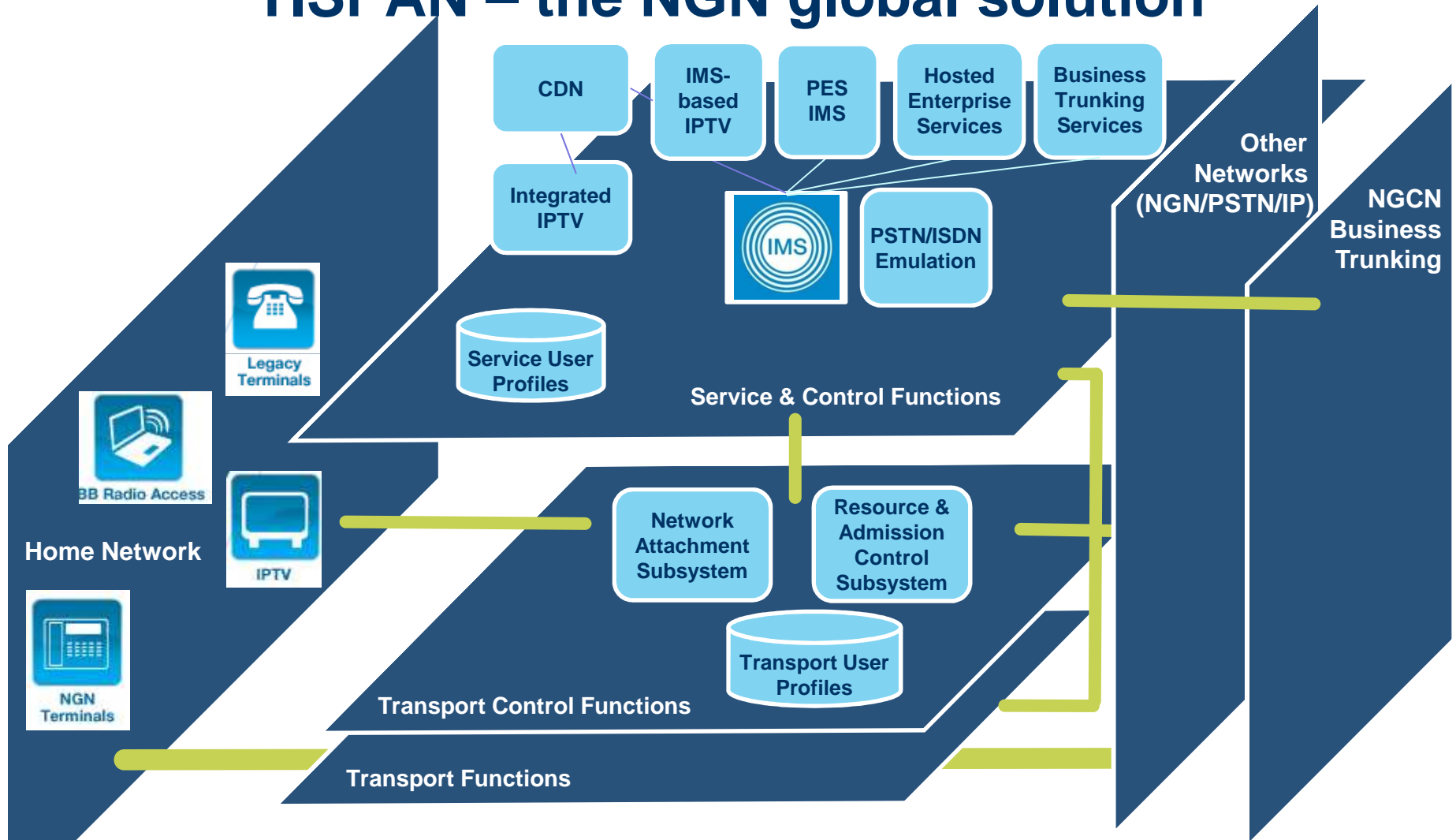
- ❑ **Experienced in regulatory requirements**
 - Regulators insist that operators adhere to recognized standards
- ❑ **Assist product development**
 - Standards play a crucial role in R&D, and product development
- ❑ **Interoperability and global reach**
 - Open and Standard interfaces ensure interworking on a global scale
- ❑ **Cost reduction**
 - Grow the market and harvest the economies of scale
 - Reduce the cost compared to integrating multiple non-standard solutions
- ❑ **Prevent vendor lock-in, enlarge market opportunities**
 - Allow greater choice of vendors, ensuring competitive pricing and access to data and high quality,
 - Possible to adopt an optimal “mix and match” strategy
- ❑ **Close co-operation with other stakeholders**
- ❑ **Arena for expert networking, global reach**
 - Excellent platform to meet like minded people & share ideas
 - Introduce company developed solutions in the standards



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ETSI TISPAN OVERVIEW

TISPAN – the NGN global solution



TISPAN

What have we done?

□ NGN Release 1: (December 2005)

- Adopts the 3GPP IMS standard for SIP-based applications, and adds further functional blocks and subsystems to enable fixed access to IMS and to handle non-SIP applications

□ NGN Release 2: (April 2008)

- TISPAN and 3GPP agreed on Common IMS platform
- Introduces new IMS enabled services and adds key elements to the NGN such as :-
 - Supplementary services (see 3GPP)
 - IPTV (both IMS and non-IMS based)
 - Home Networking
 - Corporate networks and the NGN

TISPAN

What are we doing?

- ❑ **NGN Release 3: (present active release)**
Improvement of several aspects introduced in the previous Releases, such as:
 - **IPTV service evolution**
 - **IP Network to Network interconnection**
 - **Corporate Network interconnection**
 - **Home Network interconnection**
 - **QoS and Security**
 - **CDN**
 - **P2P Study**

TISPAN – the NGN global solution

- ❑ 'plugging in' new Subsystem
- ❑ Separate Transport and Service Layers
- ❑ Open access to services from multiple operators
- ❑ Interoperability and flexible innovative services
- ❑ Core IMS
 - Based on 3GPP IMS core
- ❑ PSTN Emulation
 - CS phones: emulate legacy CS core network
- ❑ RACS
 - Resource admission control in Access Network
- ❑ NASS
 - Access authentication
 - NW configuration e.g. DHCP
 - Location function

+ Technical solutions for Regulatory issues

Advertising

Targeted advertising and advertisement-less content delivery to allow new business models

Time Shift

Legal framework to support content storage, redistribution and content access from multiple devices

Privacy

Protect privacy of users and their profiles and content (whilst allowing for lawful intercept)

Piracy

Provide a framework for detection and prosecution



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IPTV EXAMPLES

Social TV: Watching Together when Apart



My buddy list shows who is watching TV...

Share Program Recommendations



... so I can send a recommendation if I'm watching an interesting program...

... and see when my buddy accepts the recommendation!

Alice is also watching this channel.

N-PVR: Record Content for Yourself and Others

Store my recorded or personal content...

What would you like to watch with Alice?

Friends series 6 episode 1

My ski holidays

Troy

... and share it with my buddies!

John invites you to watch "My ski holidays" with him. Accept?

Targeted Advertising



John
30-something
Bachelor



Jane
Mother of 3

... and many more services!



...schedule a movie with my buddies using the Program Guide...



Receive recommendations even if I am offline...

TV-GUIDE				12:49
23. Marz	12:00	12:30	13:00	
ARD	Tagesschau	ARD-Buffer	ARD-Mit...	Philip
ZDF	Tagesschau	drehscheibe Deutschland	ARD-Mit...	
RTL	Punkt 12			Lisa
RTL2	Takeshi's Castle	Jackie Chan Adventures		
3sat	Not...	100 % Urlaub	Burgen, Schlösser...	
EuroSport	Tennis: WTA-Turnier			
WDR	Sturm der Liebe	John	WDR aktuell	

...get recommendations from my Sport Buddy.



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ETSI TISPAN IPTV OVERVIEW

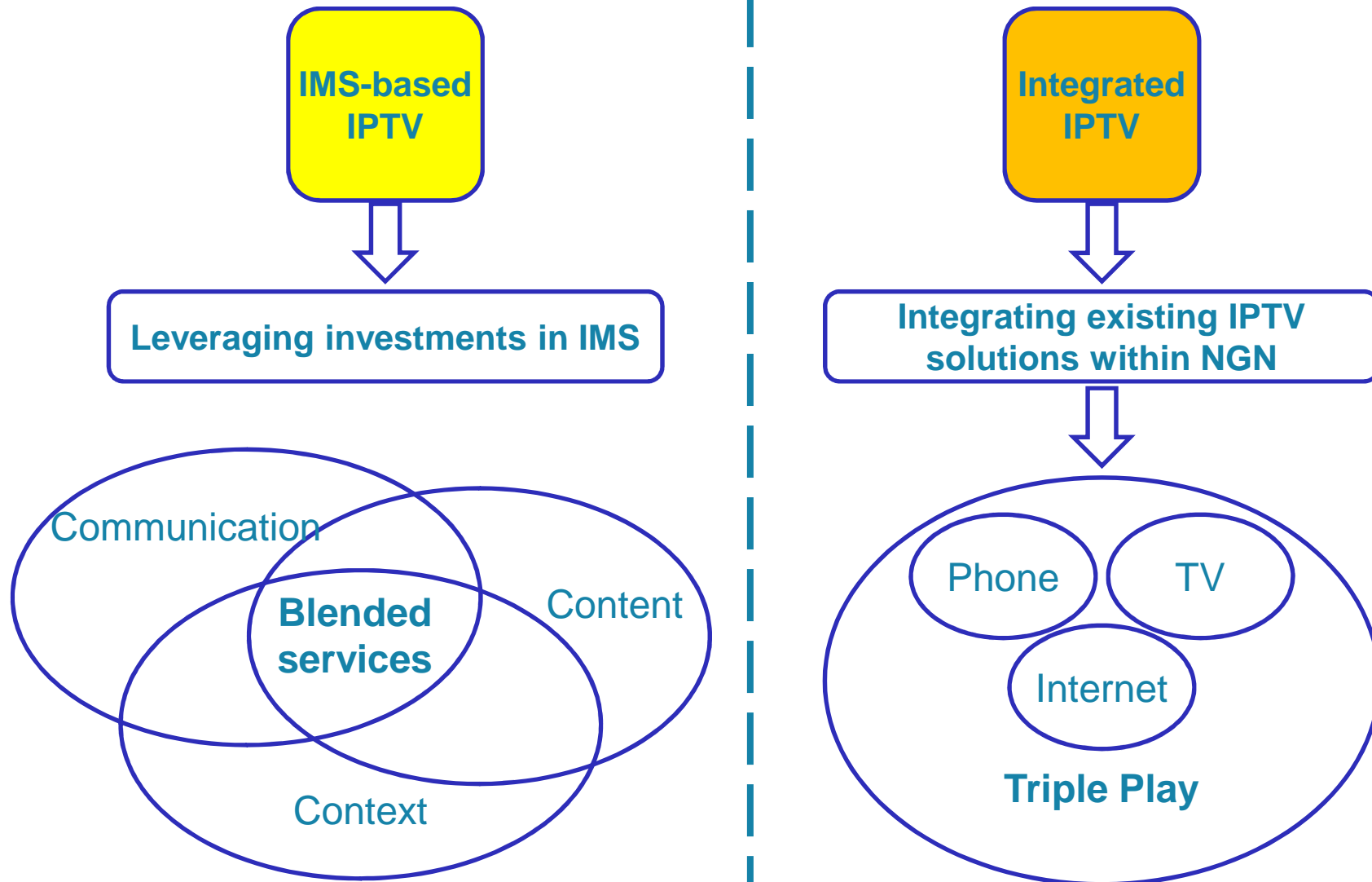
ETSI TISPAN IPTV Overview

- ❑ TISPAN Release 2 introduced IPTV to the NGN architecture:
Broadcast TV, Content on-Demand, Network-PVR

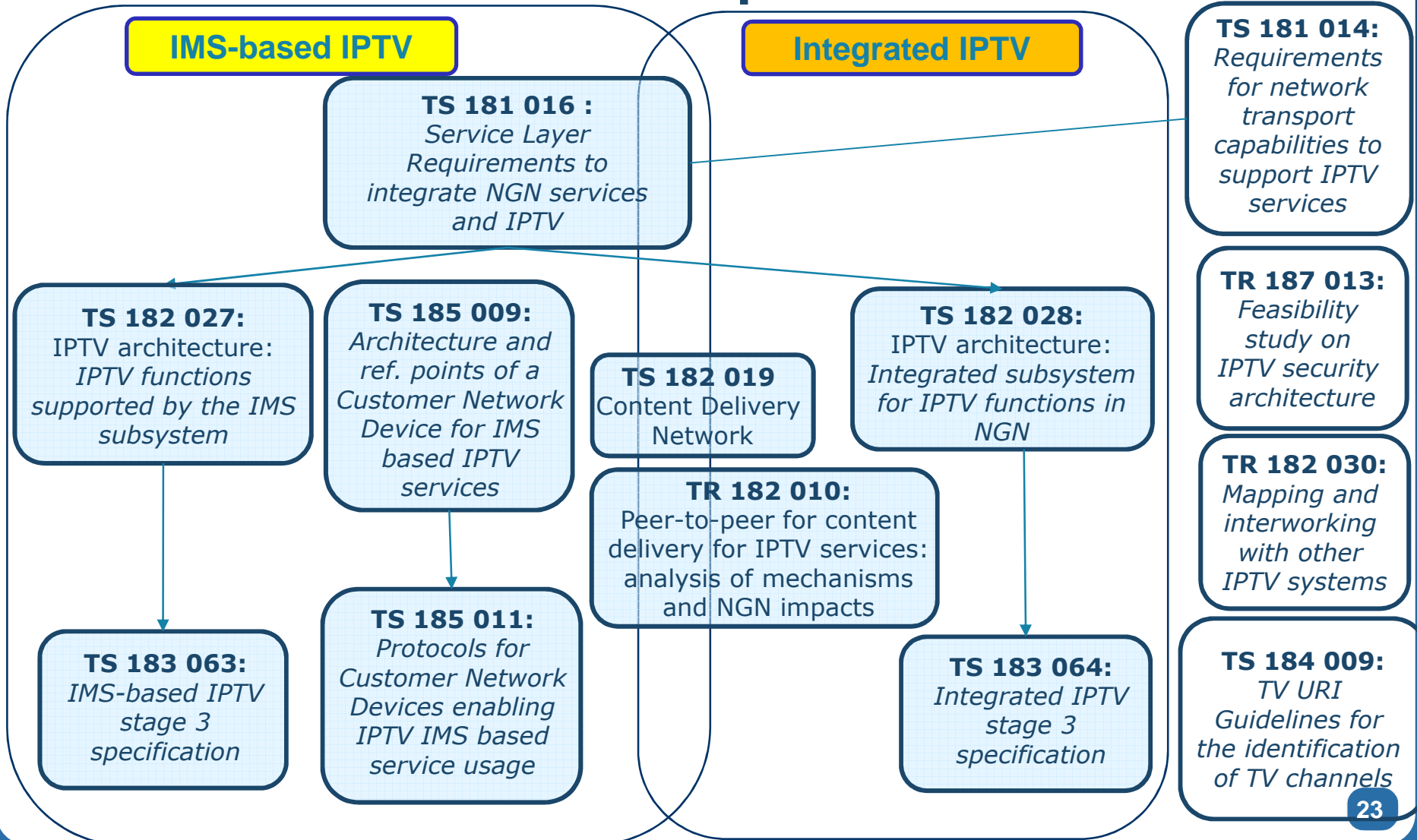
- ❑ TISPAN Release 3 adds new kinds of services by combining NGN features (voice, data, presence, messaging, community, IPTV) :
 - User generated content
 - User recommendations
 - Personalized channel
 - Personal service composition
 - Content personalization
 - Shared service control
 - Targeted advertising
 - Messaging
 - Push CoD
 - Advanced PVR
 - IPTV Roaming / Mobility
 - Media Synchronization

- ❑ Ongoing work: CDN, P2P, ...

ETSI TISPAN IPTV Specifications



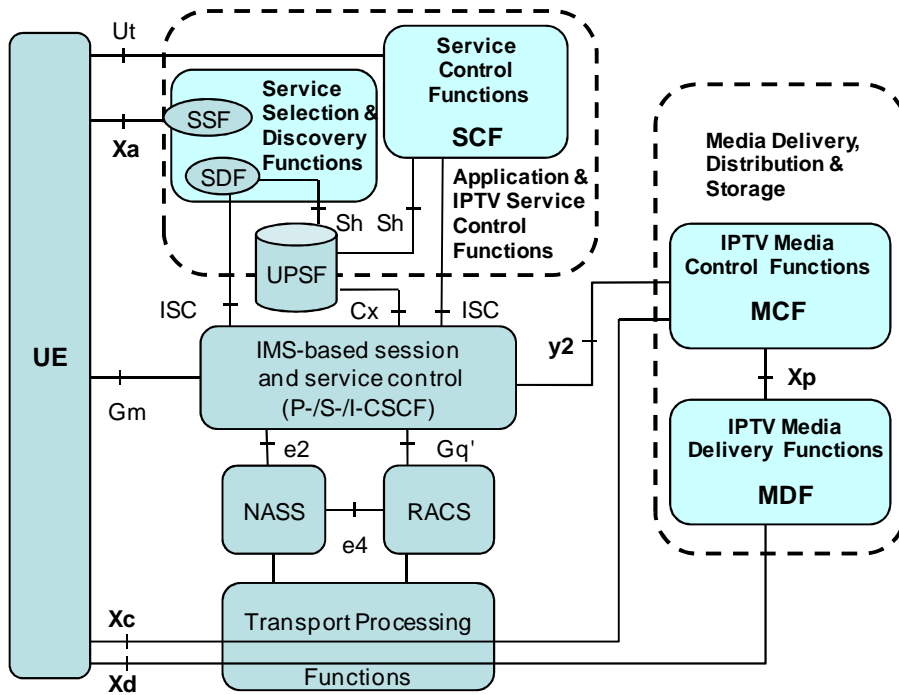
TISPAN IPTV Specifications



ETSI TISPAN IPTV Specifications

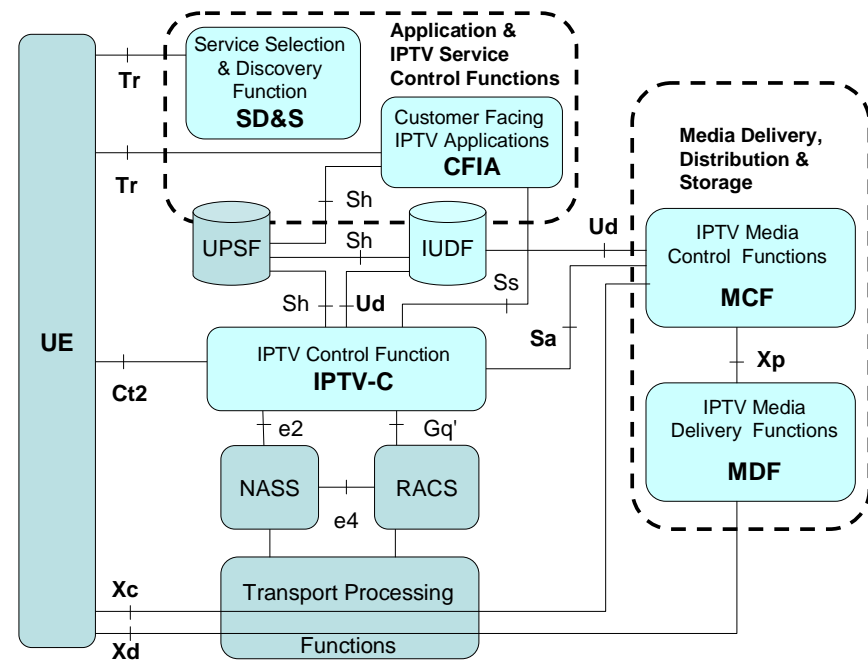
IMS-based IPTV

TS 182 027:



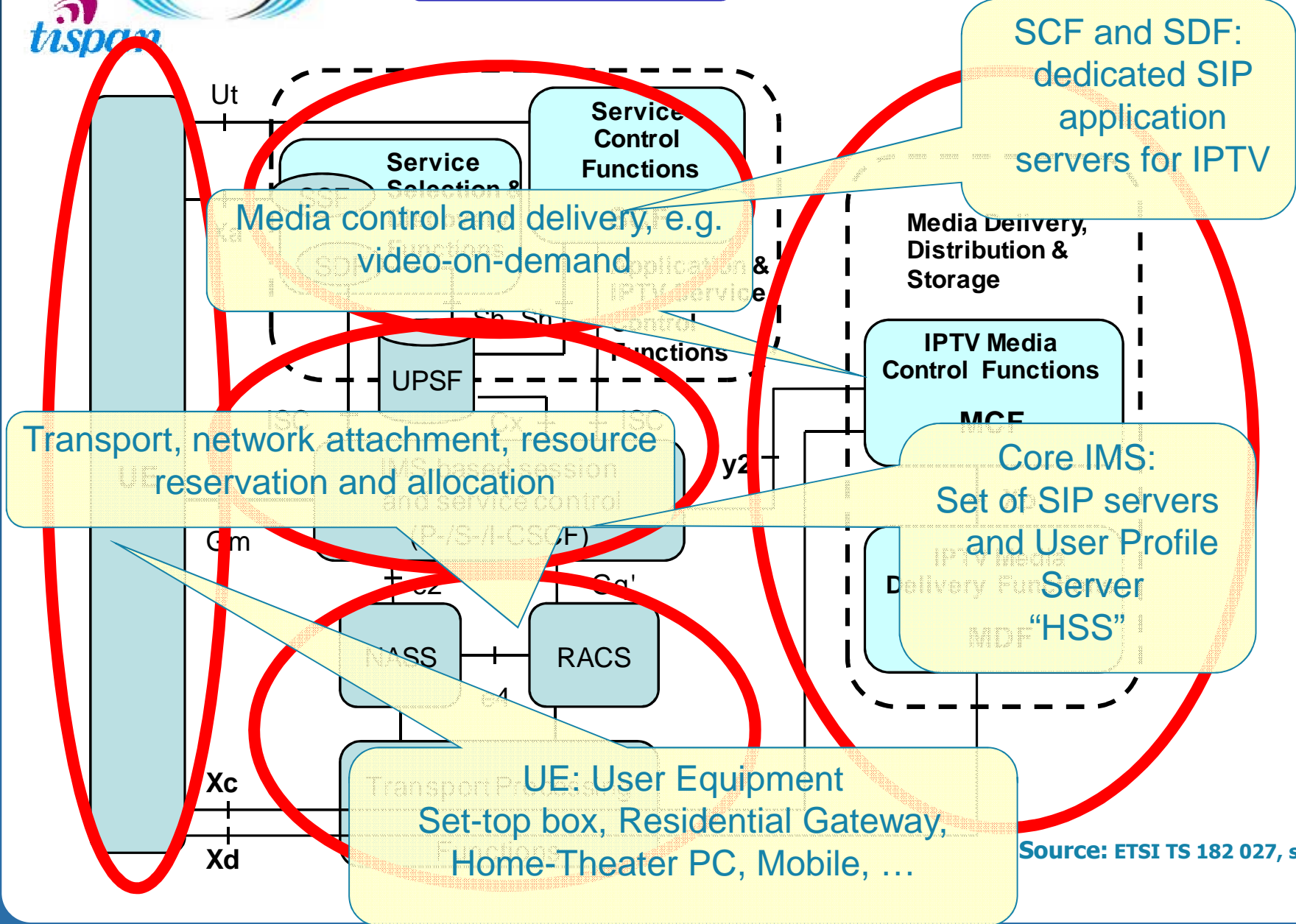
Integrated IPTV

TS 182 028:

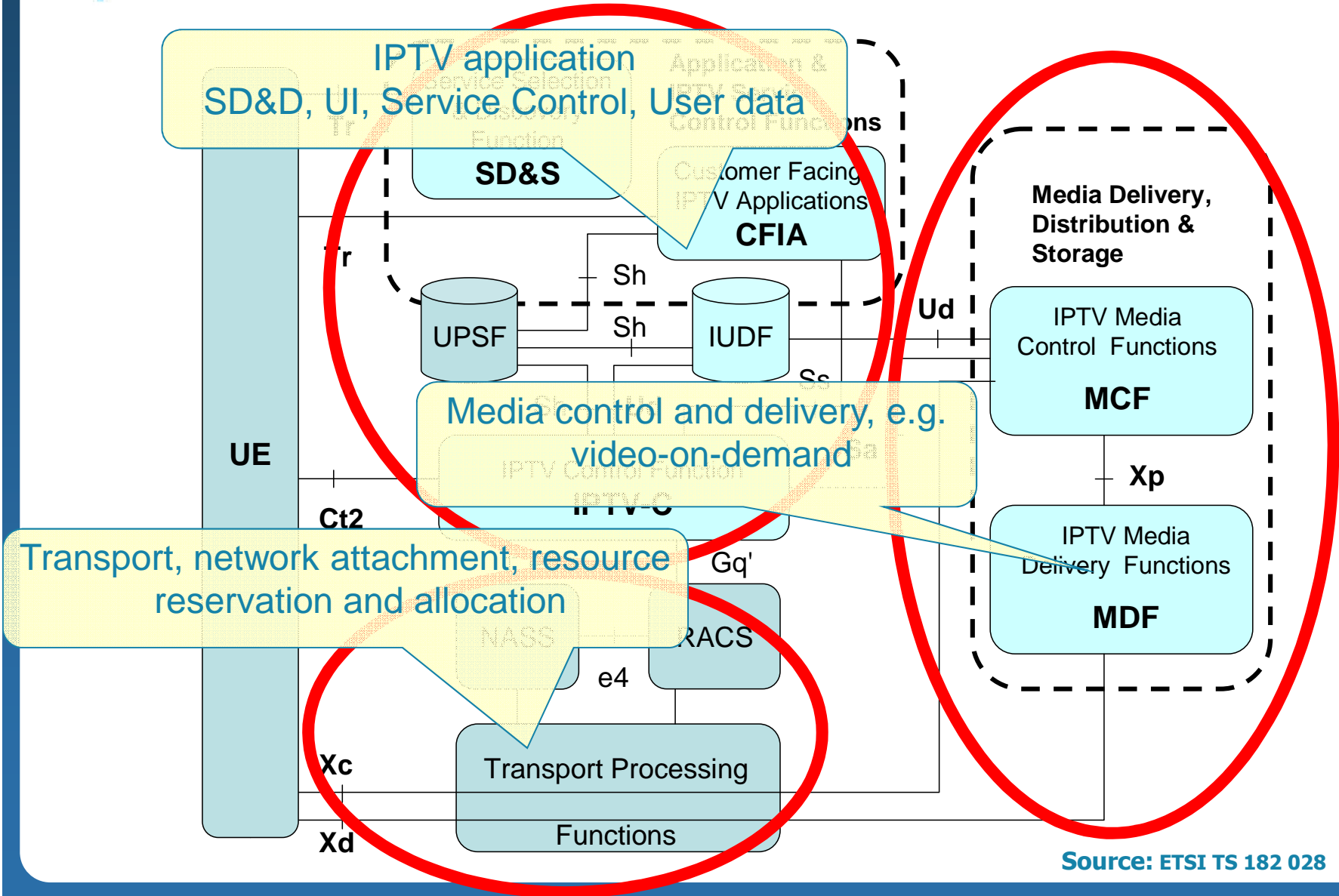


IMS-based IPTV

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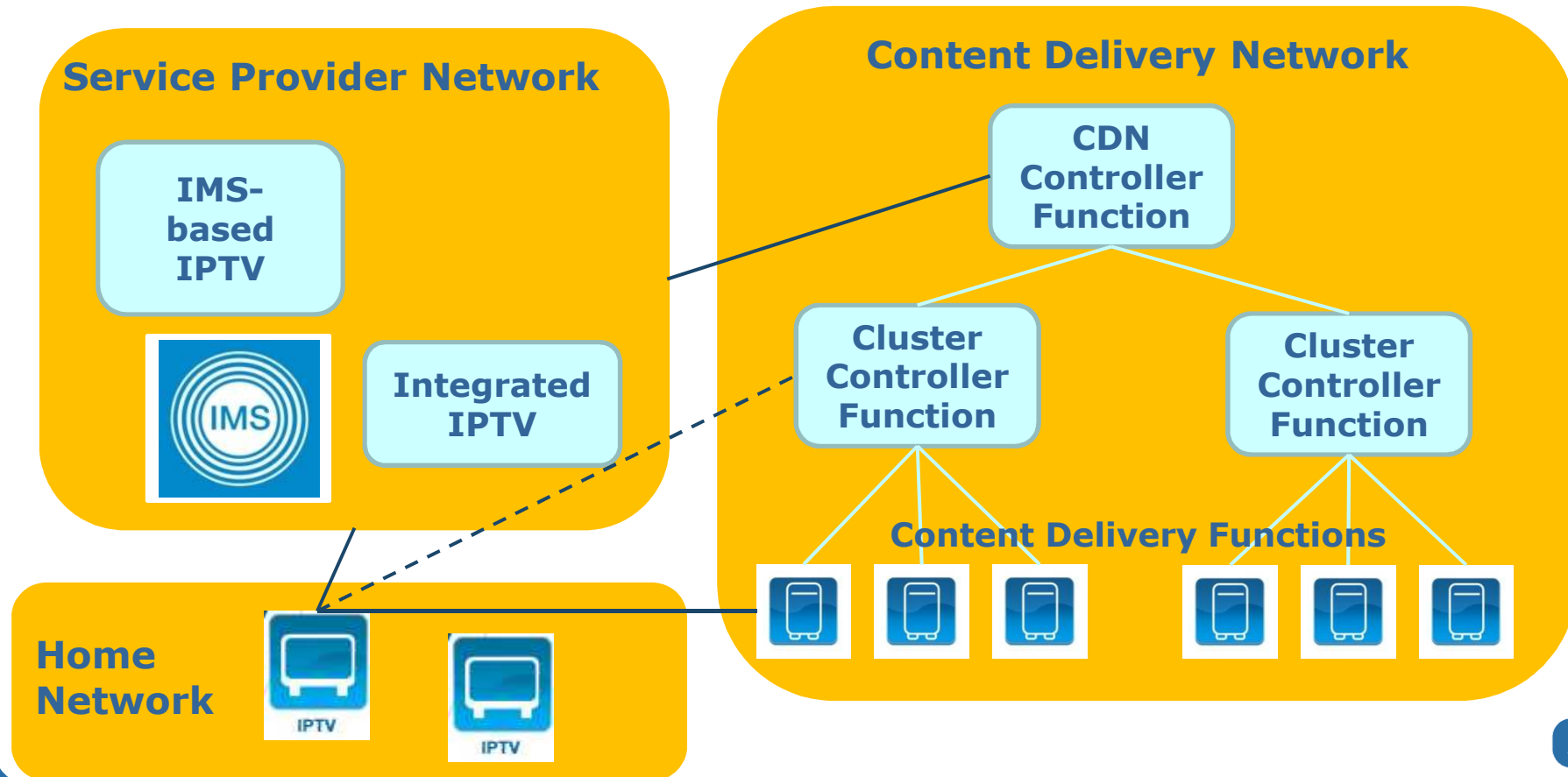


Source: ETSI TS 182 027, simplified



Content Delivery Network (CDN)

TISPAN also defines CDN functional requirements, architecture and interaction with IPTV systems



TISPAN Study: Operator-managed P2P for IPTV

No operator involvement



Full operator involvement

Degree of network operator involvement in P2P content delivery

Pure
“Over-
The-
Top”
(OTT)

Deep
Packet
Inspection
(DPI)

Network-
Based
Access
Control
(NBAC)

Peer
for peer
(P4P)

P2P-
based
operator
content
service

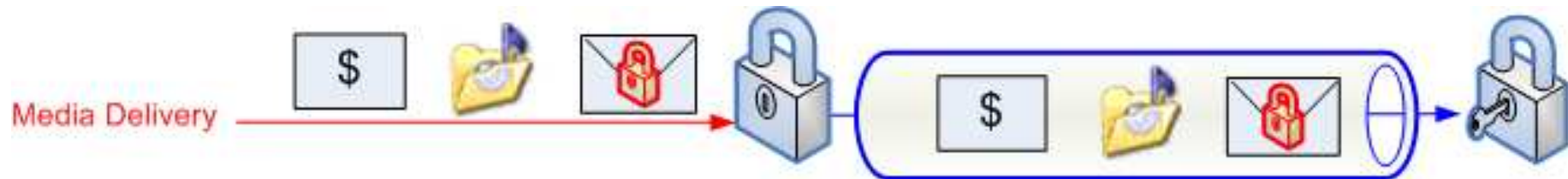
Operator
-internal
P2P-
based
CDN



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SECURITY

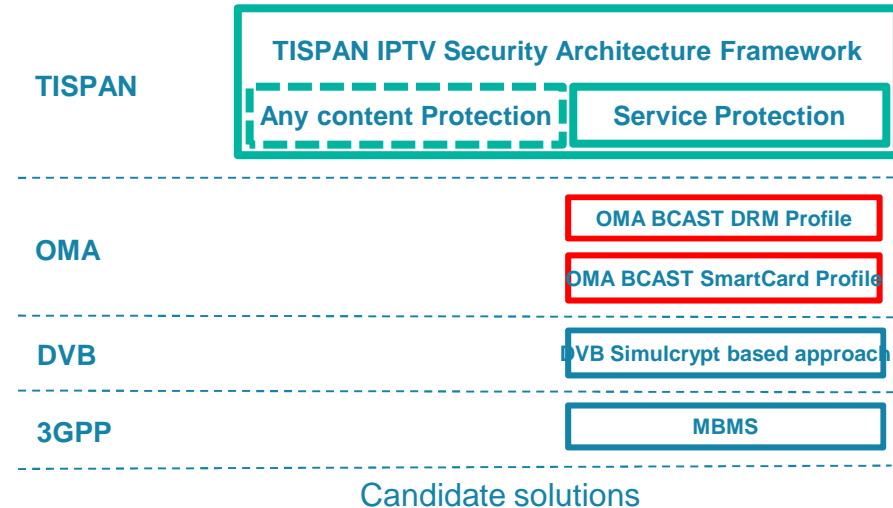
IPTV Security



- ❑ **Service protection:** the protection of content (e.g.files or streams) and service information during delivery which may include content already protected and meta data that the service provider adds to the content.
- ❑ **Content protection:** protection of content or content assets during its entire lifetime.

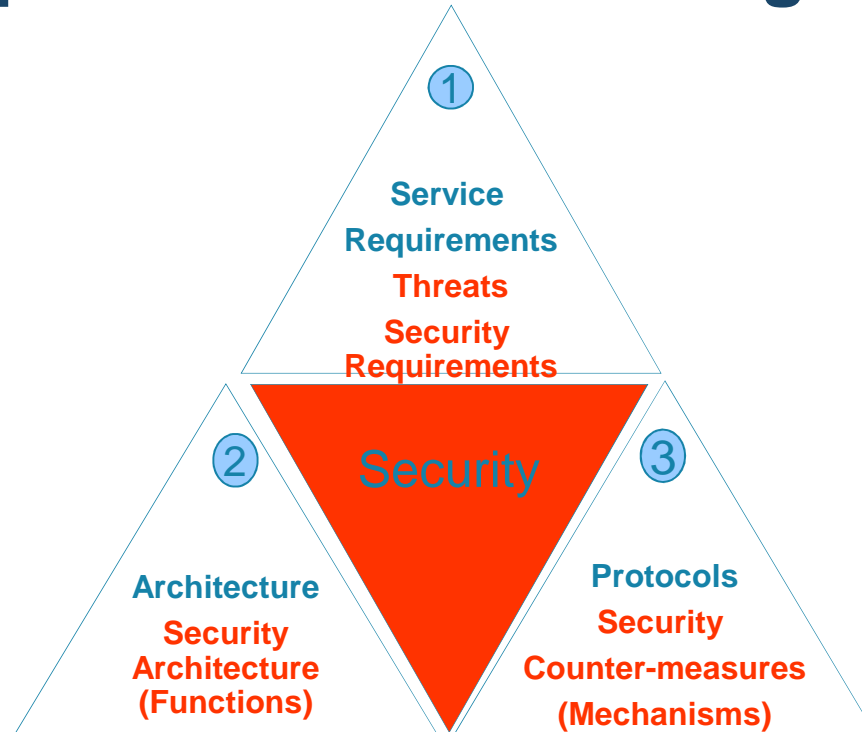
IPTV Security Architecture

- ❑ Study of options for IPTV security architecture to provide IPTV service protection
- ❑ Open framework for IPTV content protection
- ❑ Provides a general model for IPTV service protection key management and distribution architecture
 - Explores candidate key hierarchies (3 layer and 4 layer models)
- ❑ Several candidate solutions are analyzed against the TISPAN IPTV service protection security requirements
 - MBMS
 - DVB Simulcrypt-based approach for service protection
 - OMA BCAST DRM and SmartCard Profile
 - NGN security architecture and any Content Protection as a framework for simple/early deployments



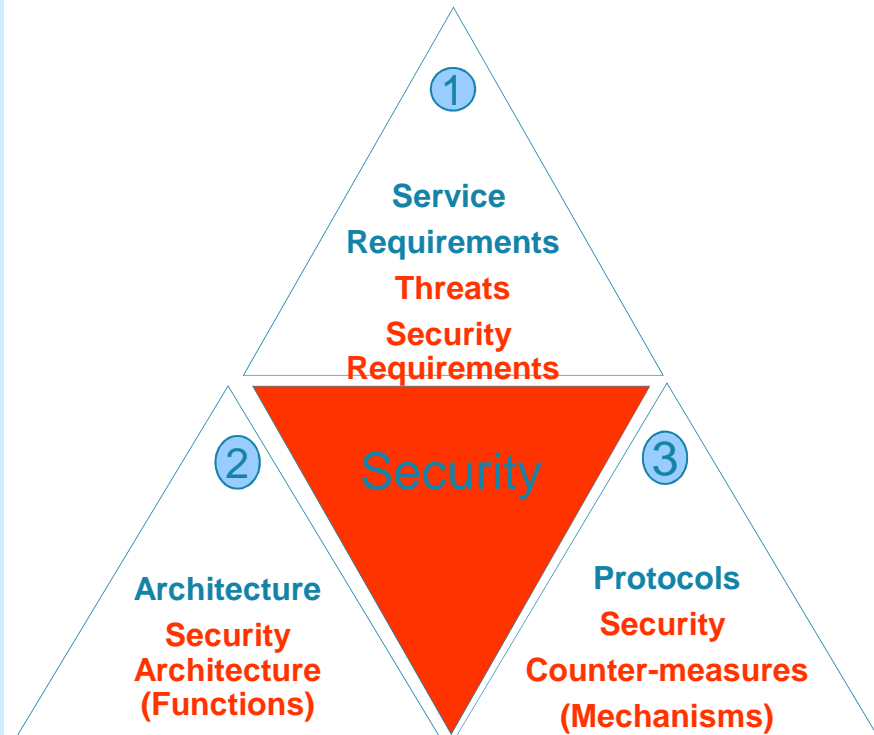
→ Both "OMA BCAST as Service Protection" and "any Content Protection combined with existing NGN Security Architecture" are recommended solutions for the IPTV Security Architecture

IPTV-Security Requirement Approach. Development of IPTV-building blocks.



IPTV-Security Requirement Approach. Development of IPTV-building blocks.

- Analyze IPTV services. Based on this analysis, design an appropriate security model.
 - Based on Service requirements*, identify security objectives and threats and from that deduce security requirements
 - Define security architecture taking into account service and security requirements
 - Develop appropriate countermeasures as re-useable building blocks



* References:

ETSI TS 181 016. TISPAN; Service Layer Requirements to Integrate NGN Services and IPTV.
 ATIS. IPTV DRM Interoperability Requirements. ATIS-0800001.
 ATIS. IPTV Architecture Requirements. ATIS-0800002.

Resulting IPTV security requirements

For all IPTV content:

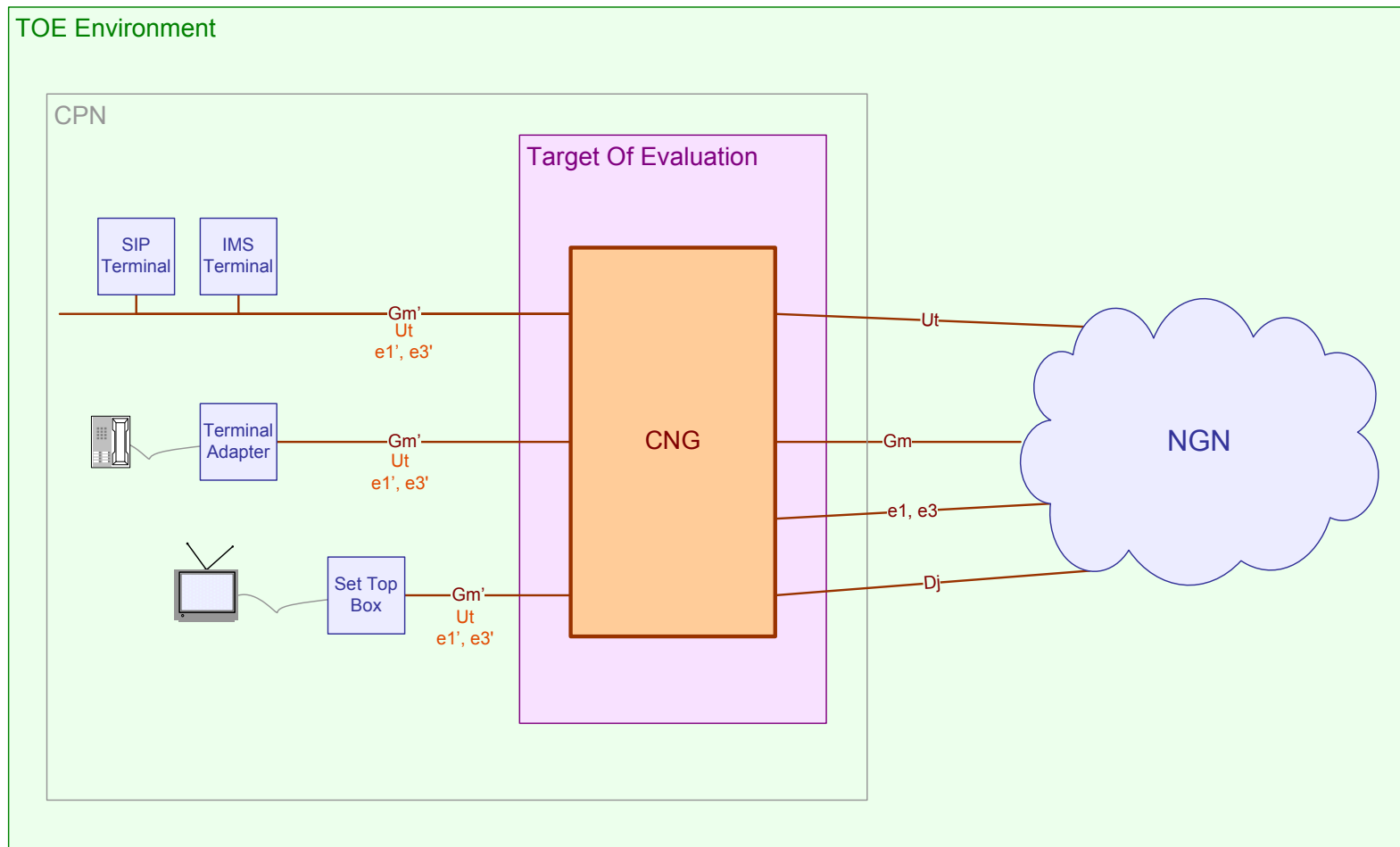
- **Unique identities**
- **Non-forgable identities**
- **Authentication and authorization**
- **Authenticity**
- **Unique identities to the origin**

Resulting IPTV security requirements:

- (R-IPTV-CN-1)** The NGN R2 IPTV service shall assign unique identities to all IPTV content that are verifiable for users, named groups of users, entities acting on behalf of users and entities acting on behalf of named groups of users
- (R-IPTV-CN-2)** The NGN R2 IPTV service shall assign non-forgable identities to all IPTV content that are verifiable for users, named groups of users, entities acting on behalf of users and entities acting on behalf of named groups of users
- (R-IPTV-CN-3)** The NGN R2 IPTV service shall authenticate and authorise all IPTV content to the receiving user, named group of users, entities acting on behalf of a user, and entities acting on behalf of named group of users
- (R-IPTV-CN-4)** The NGN R2 IPTV service shall verify the authenticity of all IPTV content to the receiving user, named group of users, entities acting on behalf of a user, and entities acting on behalf of named group of users
- (R-IPTV-CN-5)** The NGN R2 IPTV service shall assign unique identities to the origin of all IPTV content that are verifiable for users, named groups of users, entities acting on behalf of users and entities acting on behalf of named groups of users

For the complete list : RTS 187 001 (NGN Security requirements for Release 2)

Home Networking Security



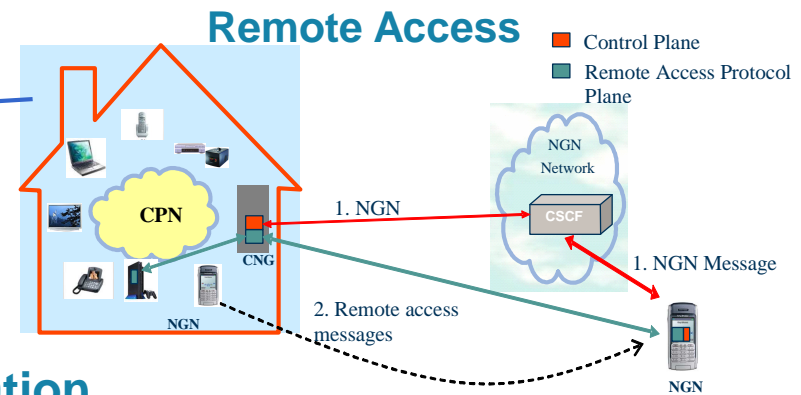
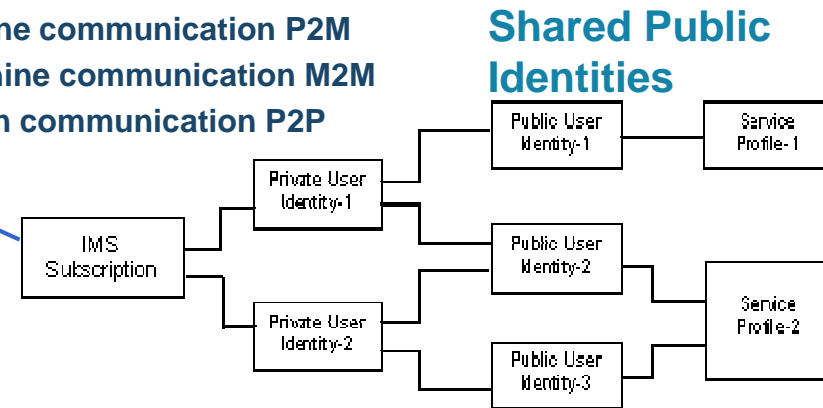


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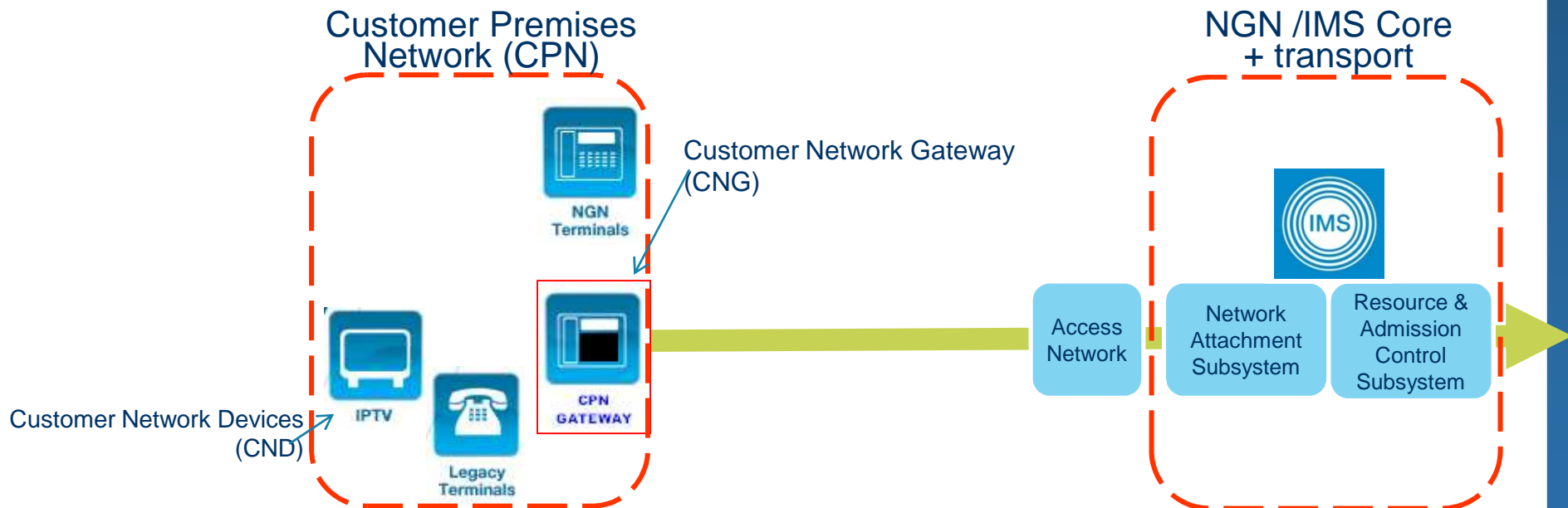
HOME NETWORK DETAILS

Service Requirements

- **Communication**
 - 1. Person-to-Machine communication P2M
 - 2. Machine-to-Machine communication M2M
 - 3. Person-to-Person communication P2P
- **Broadband connection**
- **Entertainment and information**
- **Home worker**
- **Remote Access**
- **Home Management and Security**
- **Provisioning and Service configuration**



TISPAN sees Home Networks as an IMS NGN end-point

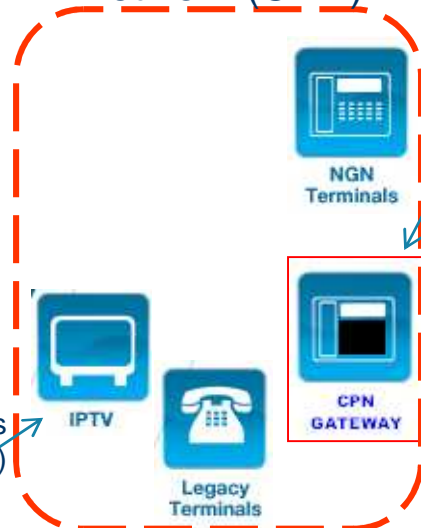


Architecture Specifications

TS 185 005 (R3):
Services Requirements and Capabilities for CPN's

TS 185 004 (R2):
High level customer network architectures

Customer Premises Network (CPN)



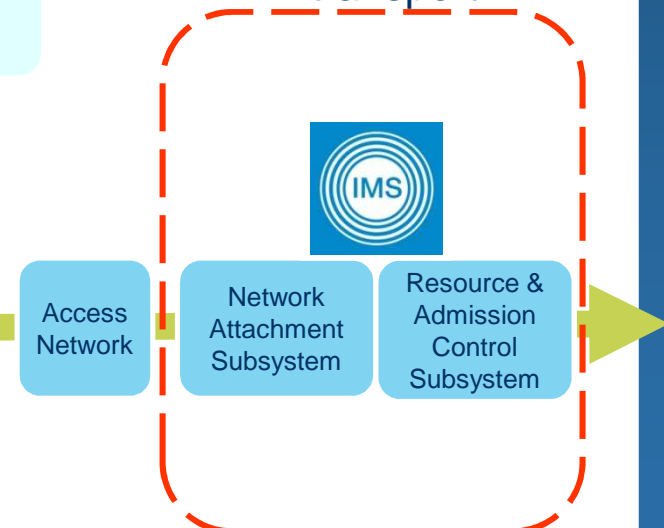
Customer Network Devices (CND)

TS 185 003 (R3):
CNG Architecture and Reference Points

Customer Network Gateway (CNG)

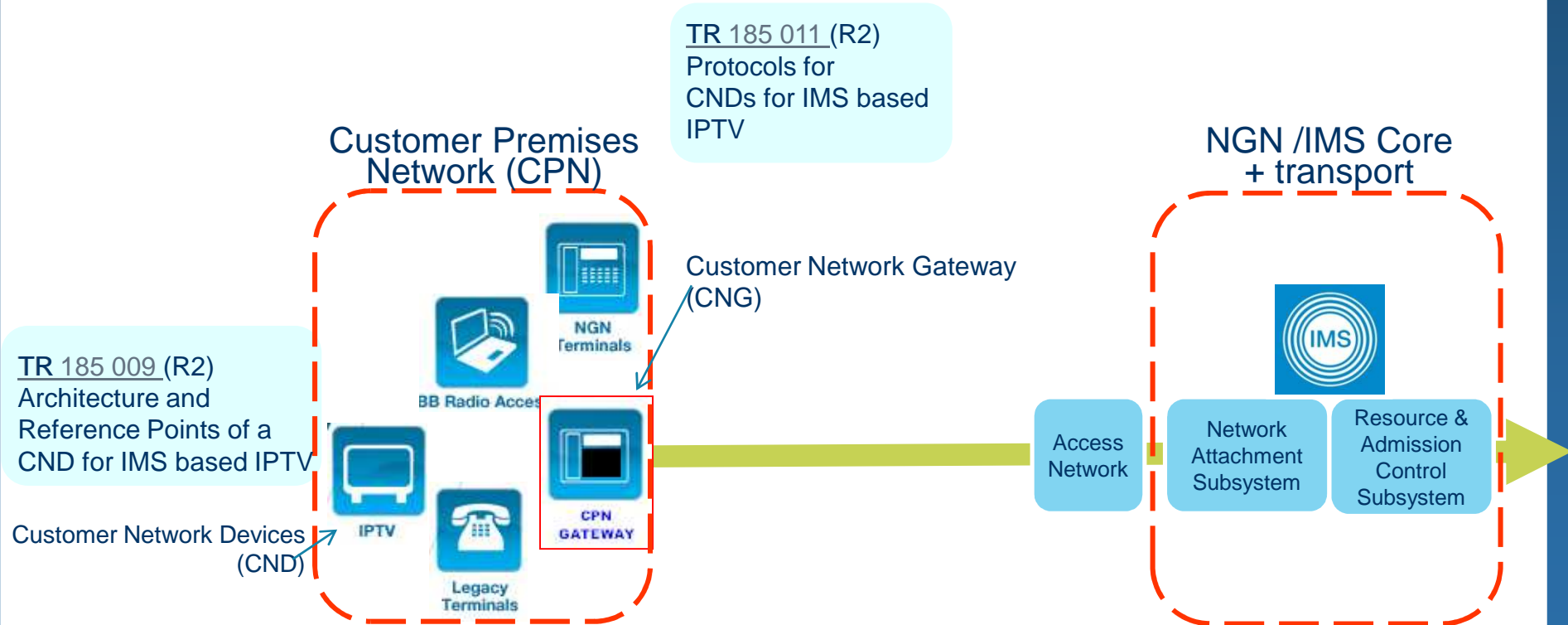
TR 185 013 (R3):
Codec's for CND's

NGN /IMS Core + transport



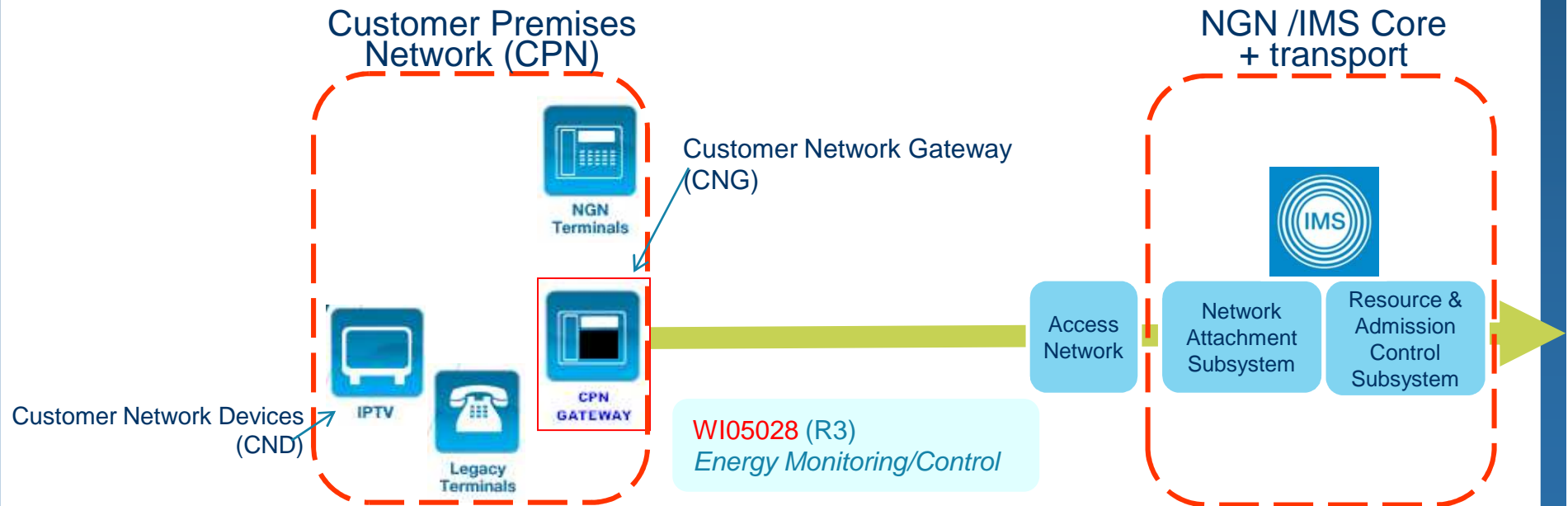
TR – Technical Report
TS – Technical Specification

IPTV Specifications



Security, Energy Monitoring ...

TS 187 001 (R3) WI
07036 NGN Security
Requirements

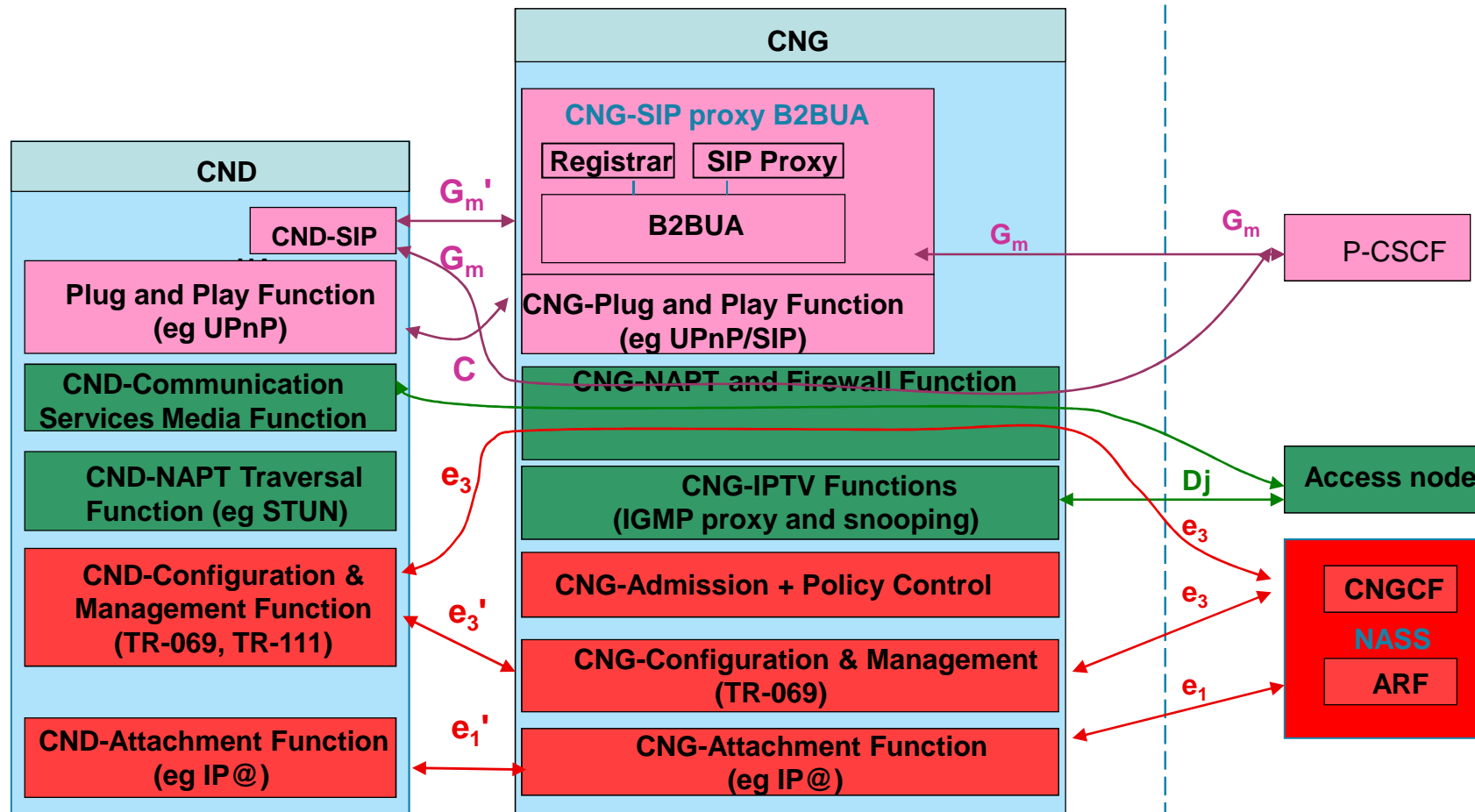


Home Networking Details

Customer Network Device

Customer Network Gateway

NGN and IMS

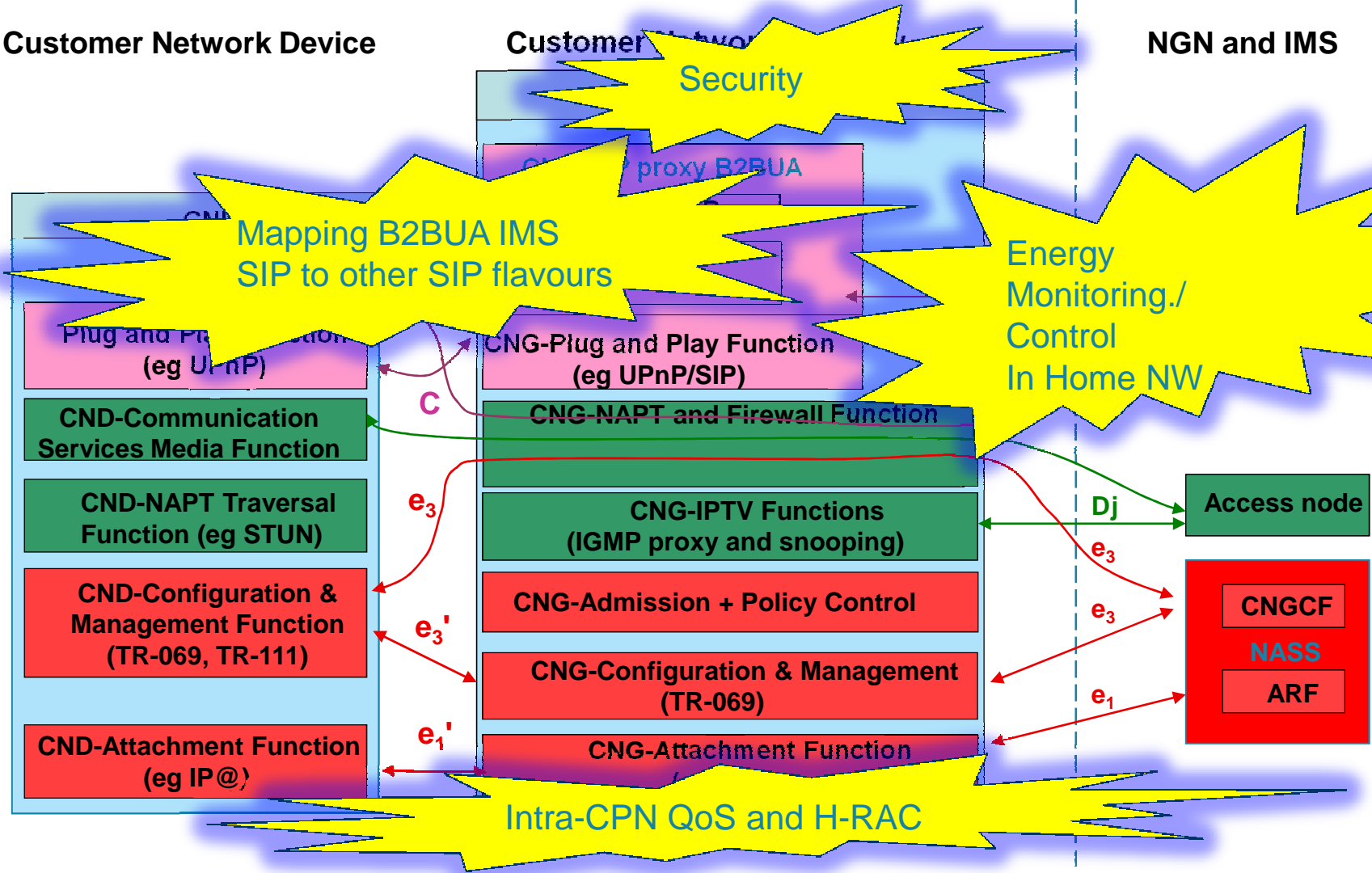


Home Networking Details

Customer Network Device

Customer Network Device

NGN and IMS





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REFERENCE & ACKNOWLEDGEMENT

Acknowledgement

- **Claudia Becker, France Telecom**
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- **Eugen Mikoczy, Slovak Telekom**
- **Omar Niamut, TNO Information and Communication Technology**
- **Judith Rossebo, Telenor**
- **Mischa Schmidt, NEC Europe Ltd.**
- **Oskar van Deventer, TNO Information and Communication Technology**



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CONCLUSIONS

Conclusions

- ❑ **TISPAN offers globally available specifications, see:**
 - <http://pda.etsi.org/pda/queryform.asp>
 - <http://www.etsi.org/tispan/>
 - <http://docbox.etsi.org/TISPAN/>
- ❑ **Priorities:**
 - **Interoperability**
 - **Compatibility to existing technologies**
 - **Open access to innovative applications**
- ❑ **TISPAN cooperates with other SDOs to offer the right solutions**
 - **Our open system allows other SDOs / groups to build on our work**



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Additional Information

Protocols Used



- SP Discovery using SIP**
- IGMPv3 / MLD v2 for Multicast Channel Switching
- MPEG2TS over RTP or direct UDP encapsulation
- RTSP for Trick Modes
- RTCP for synchronization
- HTTP for unicast EPG
- DVBSTP or **FLUTE** for Multicast EPG
- SIP for Requesting Services**



- DVB SD&S**
- IGMPv3 / MLD v2 for Multicast Channel Switching
- MPEG2TS over RTP or direct UDP encapsulation
- RTSP for Trick Modes
- RTCP for synchronization
- HTTP for unicast EPG
- DVBSTP for Multicast EPG
- HTTP for requesting services**

General characteristics	Non-NGN based IPTV architecture	NGN/IMS based IPTV architecture
Standardization	Vendors & industry driven	First NGN standards is in focus of standard bodies (ETSI TISPAN, ITU-T)
Modularity and Open protocols	Low, alternative and proprietary protocols	Higher, standardized open protocols should be used (http/XML, SIP, Diameter, RTSP, IGMP, MLD...)
Media processing and service control separation	Functions are highly integrated in network elements and middleware	Separated service control from delivery and media control, should be more scalable, distribution on hierarchical base
Control functions	Stream delivery control oriented	Media/Session control oriented – streams, communication sessions, ..
Transport control functions	Missing specialized elements, less mechanisms to effect from application the transport control	Elements in the architecture for providing QoS (in TISPAN - NASS, RACS), IMS control resource mang.





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General characteristics	Non-NGN based IPTV architecture	NGN/IMS based IPTV architecture
Network convergence	Specialized architecture for fixed or mobile network (more fixed oriented)	Common service and control layer independent from multiple fixed, wireless and mobile access & delivery networks
Application & Services	More-less limited to legacy IPTV, however, set of services may be extended by adding interfaces to middleware	Real converged services as described in ITU-T converged service framework (broadcasting & communication convergence)
Service Capabilities and Enablers	No common service capabilities or service enablers, usually should be used just those included in IPTV application server	Shareable service enablers to support a number of more complex applications should be also available for IPTV related applications (messaging, presence,..)
Service integration	Limited to each IPTV service platform	Possible across service layer of IMS based NGN architecture
Security	Security covered more by CA nor DRM systems, different proprietary AAA mechanisms per solutions	Specialized border and security functions incorporate in standards, Security covered also on transport layer as well as content protection
End devices	Limited types of STBs interworking with proprietary IPTV solutions	More standardized devices - integrated & compatible with NGN/IMS based IPTV

IPTV related functions – Why use NGN/IMS for service control?

❑ IPTV specific functions:

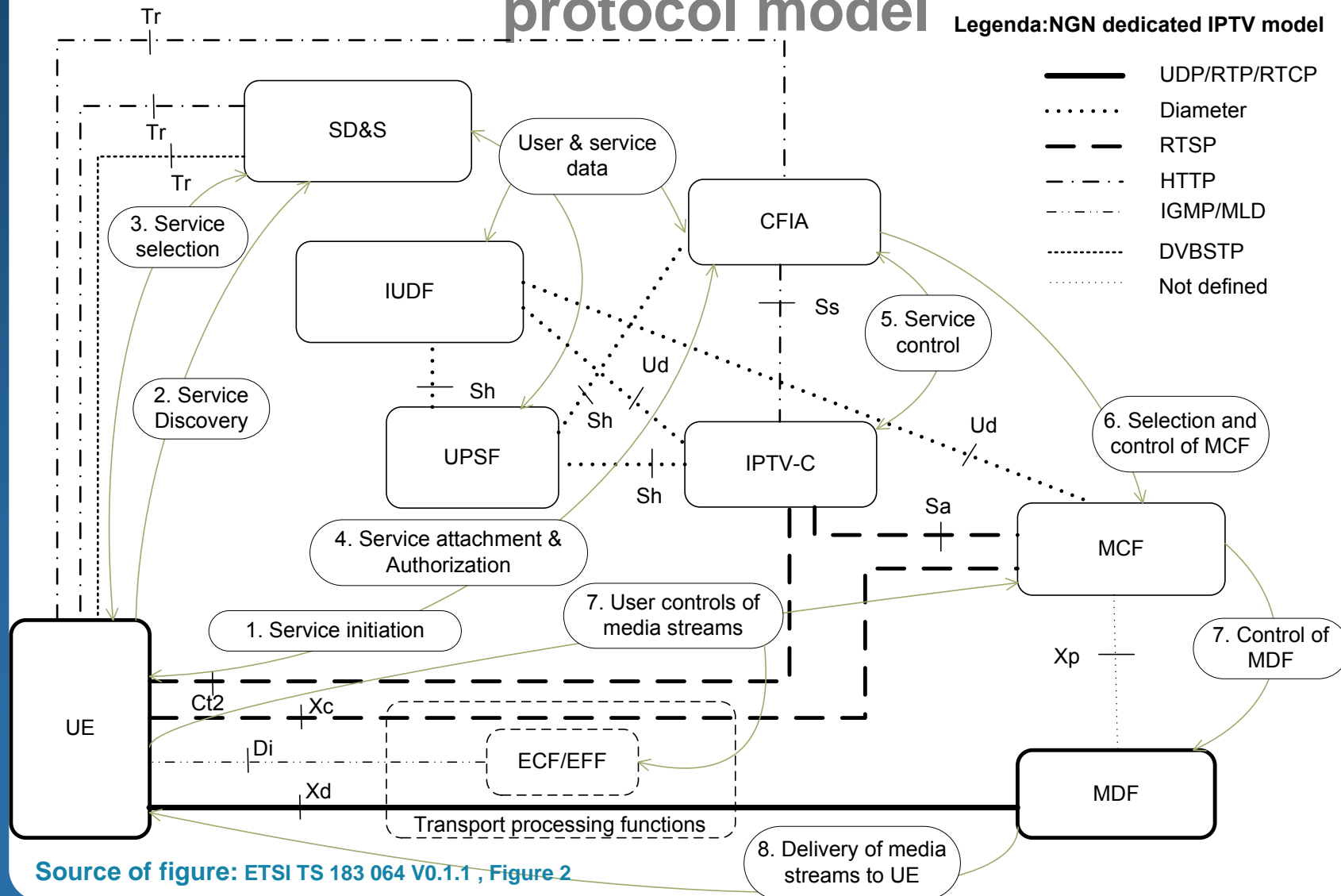
- Service discovery & selection, presentation, e.g. EPG
- Service & Content protection, e.g. DRM and CAS
- Service & Content management, managing the services and contents in the Content Provider domains and/or the Service Provider domains
- Content distribution, delivery and locating control
- Multicast support and control
- VCR control, e.g. play/pause/fast-forward/rewind

❑ NGN/IMS-enabled IPTV functions:

- User registration and authentication
- User subscription management
- Session management, routing, service trigger, numbering
- Interaction with existing NGN service enablers (presence, messaging, group management, ..etc.)
- QoS and bearer control
- Mobility, FMC capability
- Charging and billing

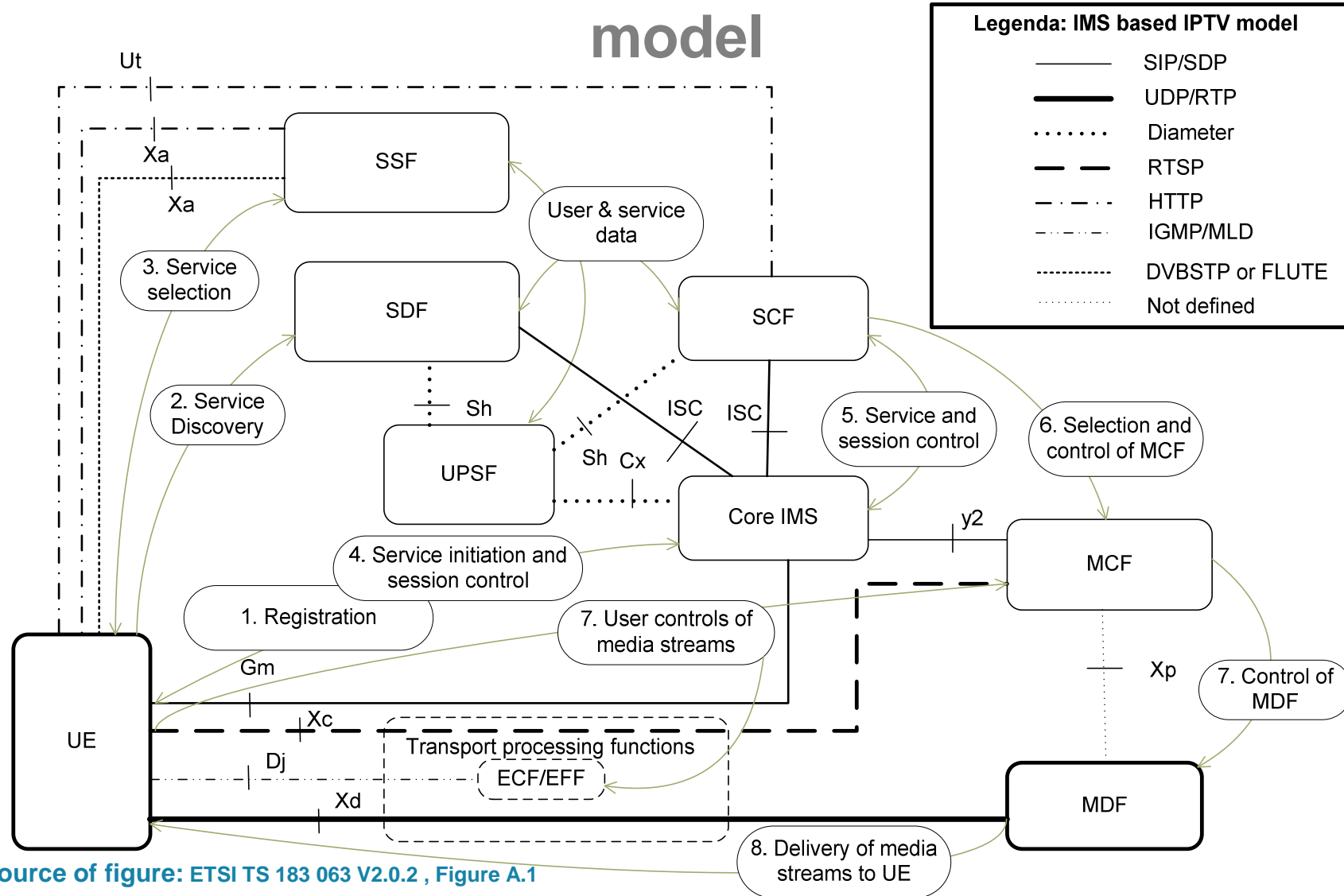


NGN integrated IPTV – stage 3 - WI 3137 – protocol model



Source of figure: ETSI TS 183 064 V0.1.1, Figure 2

IMS based IPTV – stage 3 - WI 3127 – protocol model



Source of figure: ETSI TS 183 063 V2.0.2 , Figure A.1

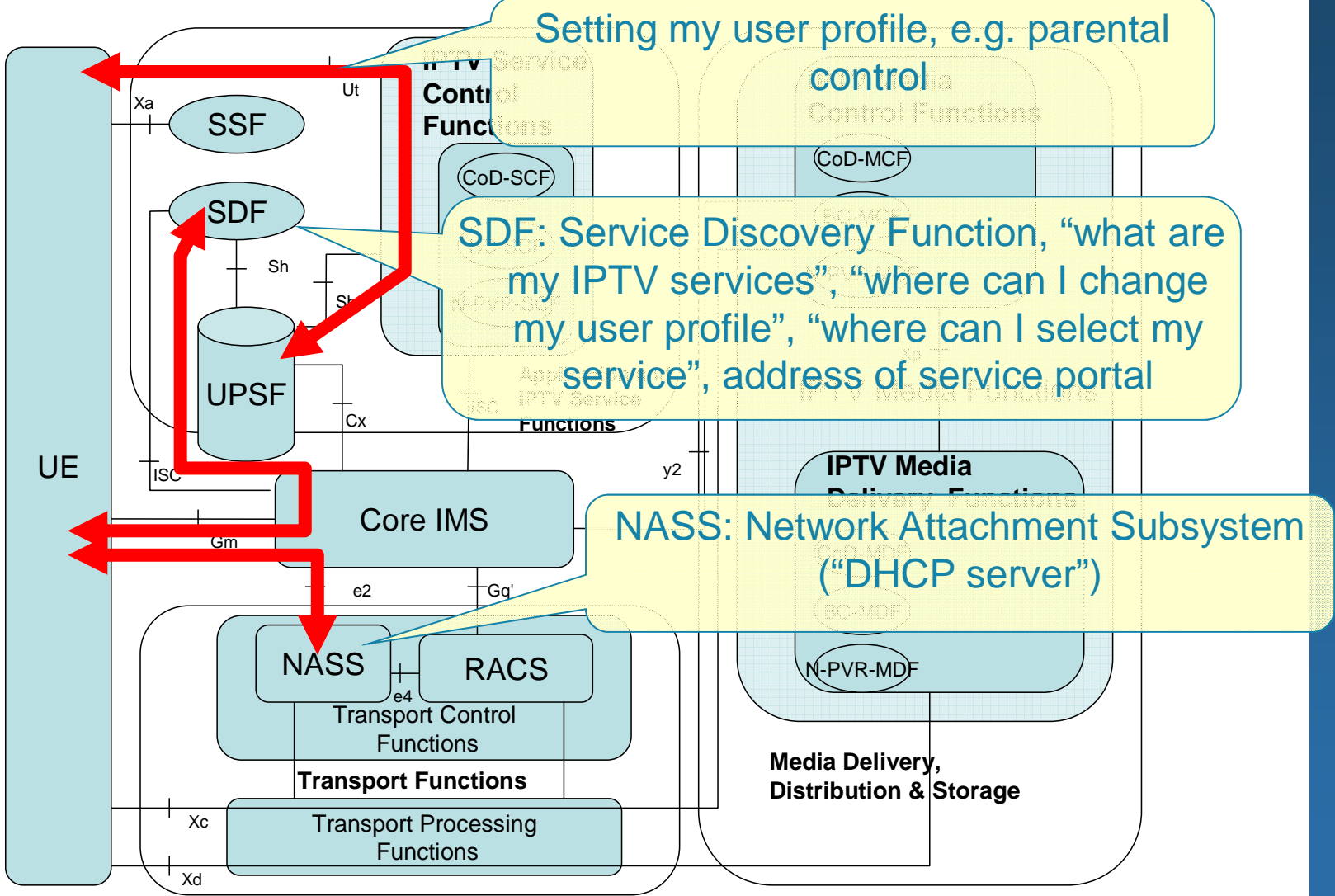


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General characteristics	IMS based IPTV architecture (NGN IMS based)	NGN dedicated IPTV architecture (NGN Non-IMS)
ETSI TISPAN specification	ETSI TS 183 064	ETSI TS 183 063
1. Service discovery & selection (SD&S)	ETSI TS 102034 based SD&S model - separate SDF, SSF SIP based (Mandatory), HTTP (Optional) , DVBSTP (Optional)	ETSI TS 102034 based SD&S model - single SD&S HTTP based (Mandatory) DVBSTP (Optional)
2. Service selection information (e.g. program guides)	via Xa to SSF - HTTP based DVB SD&S (ETSI TS 102034) [9] DVB BCG (ETSI TS 102 539) OMA BCAST ESG TISPAN XML	via Tr to SD&S - HTTP based DVB SD&S (ETSI TS 102034) [9] DVB BCG (ETSI TS 102 539)
3. Multicast control - IGMP	SIP based initiation IGMP join to ECF/EFF IGMPv3, MDLv2	Pure IGMP based IGMP join to ECF/EFF IGMPv3, MDLv2

General characteristics	IMS based IPTV architecture (NGN IMS based)	NGN dedicated IPTV architecture (NGN Non-IMS)
4. Unicast control - RTSP methods	SIP based initiation Mixture RTSP control (RFC 2326), partially ETSI TS 102034 based Method 1 – new coupled SIP/RTSP Method 2 – SIP and RTSP separated	RTSP based on ETSI TS 102034 Coupled, decoupled mode
5. Media Delivery	MPEG2TS over RTP MPEG2TS over UDP direct RTP encapsulation	MPEG2TS over RTP MPEG2TS over UDP
6. Service control (initialization, modification, teardown)	SIP based service control using IMS [10] Session based control	HTTP resp. RTSP based
7. Service configuration	Ut - XCAP	Tr - XCAP
8. Resource allocation & reservation	Via core IMS Gq' to RACS	IPTV-C Gq' to RACS





Setting my user profile, e.g. parental control

SDF: Service Discovery Function, "what are my IPTV services", "where can I change my user profile", "where can I select my service", address of service portal

NASS: Network Attachment Subsystem ("DHCP server")

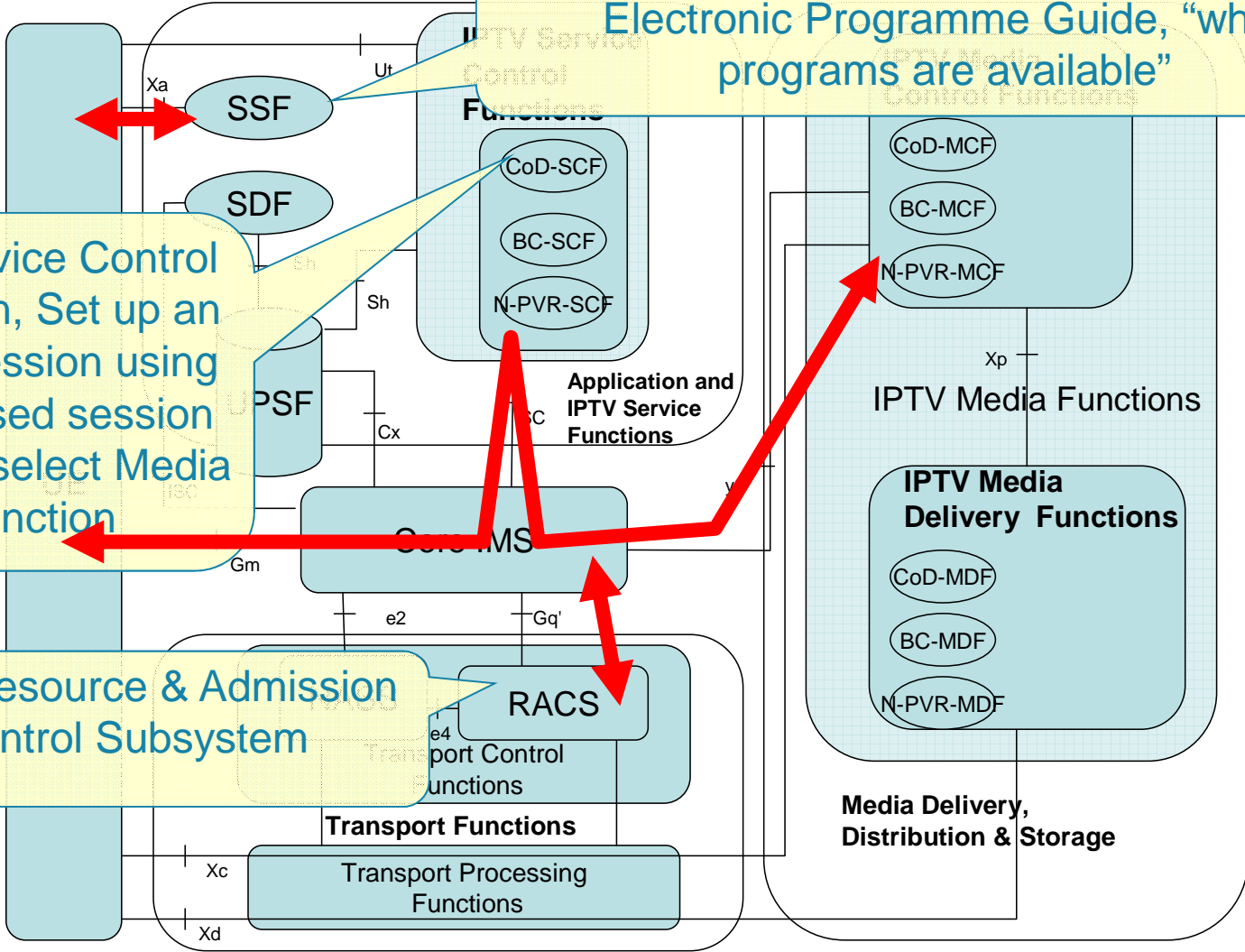
IMS-based IPTV

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SSF: Service Selection Function, getting an Electronic Programme Guide, "what programs are available"

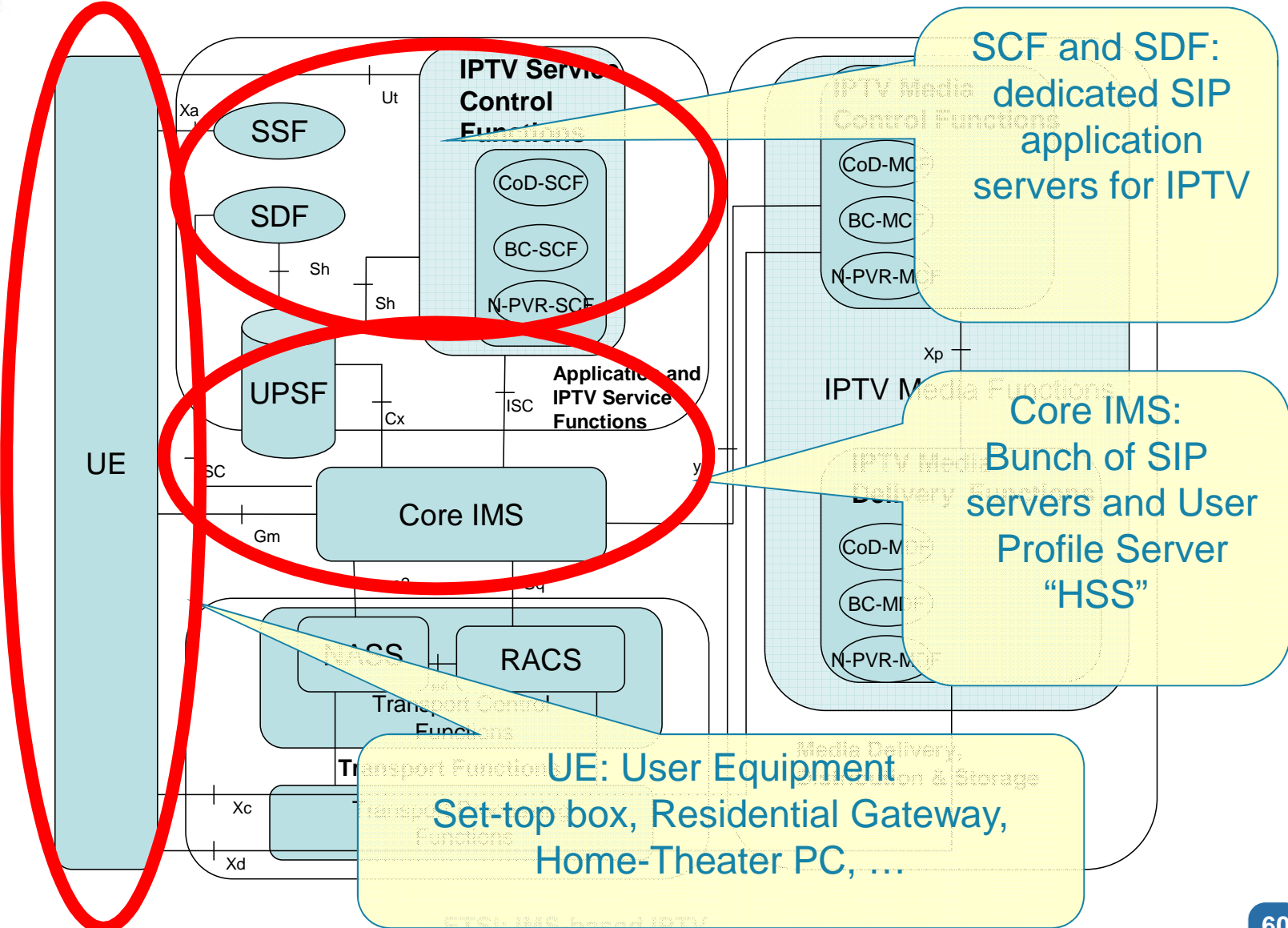
SCF: Service Control Function, Set up an IPTV session using SIP-based session control, select Media Function

RACS: Resource & Admission Control Subsystem



IMS-based IPTV

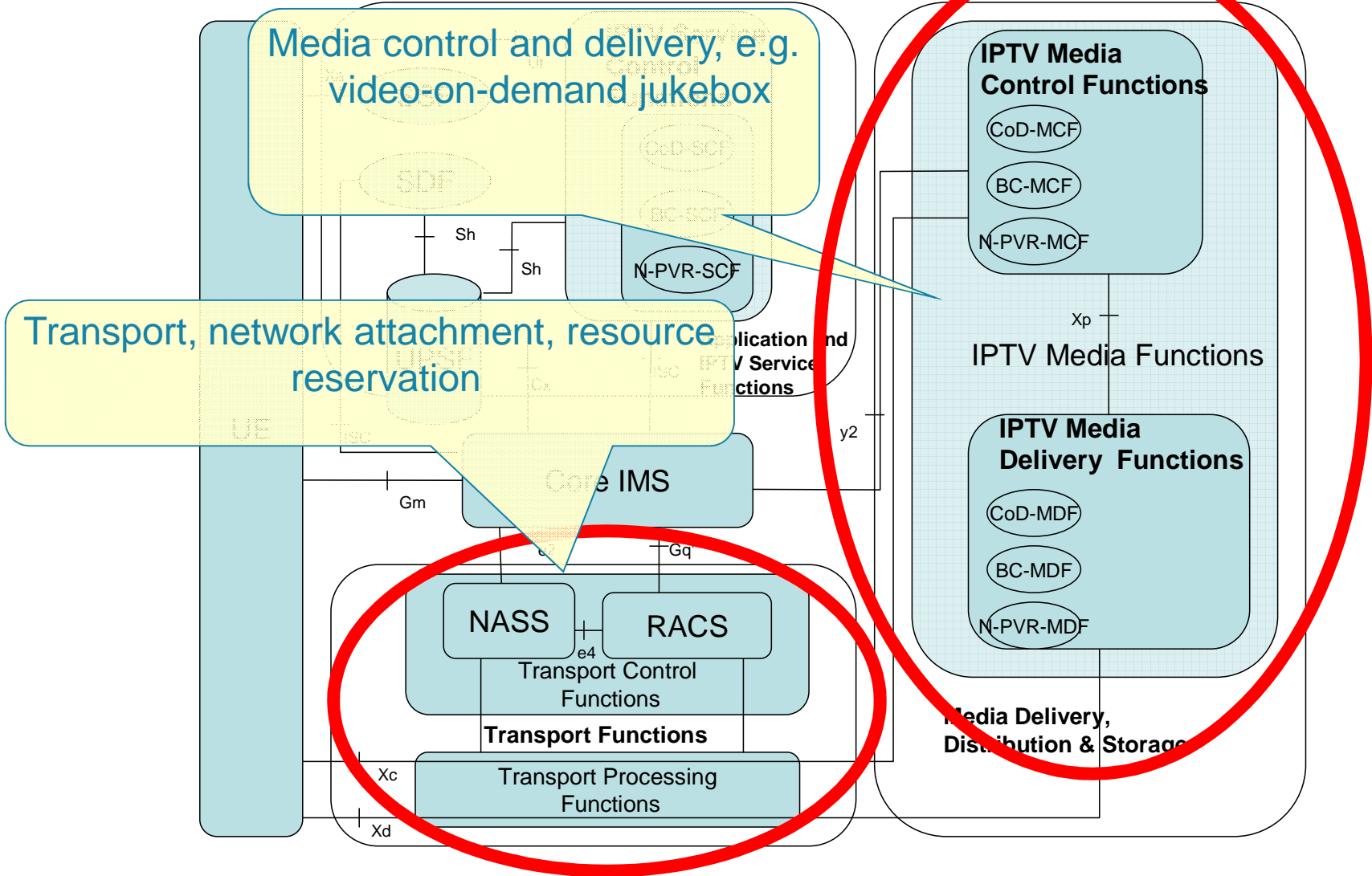
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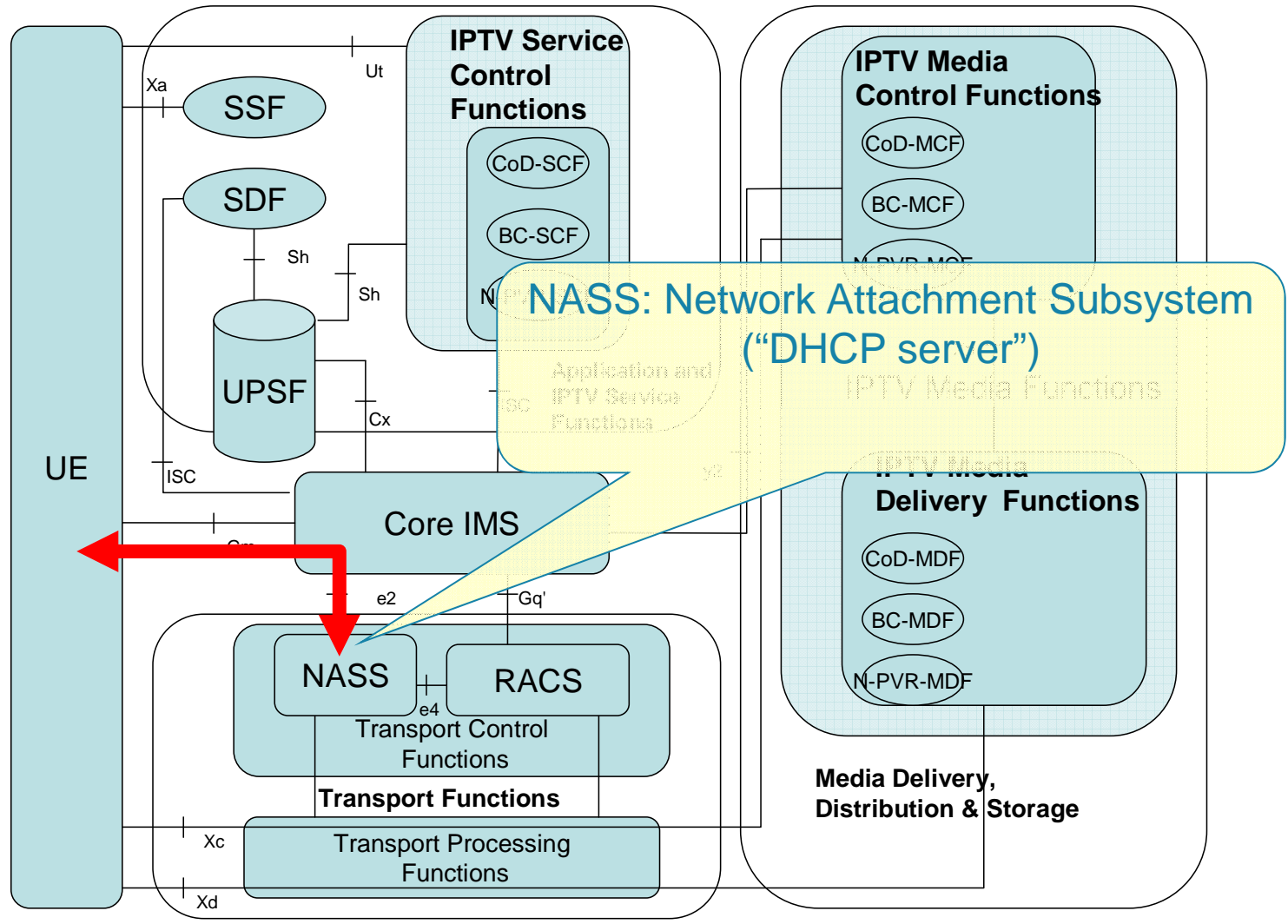


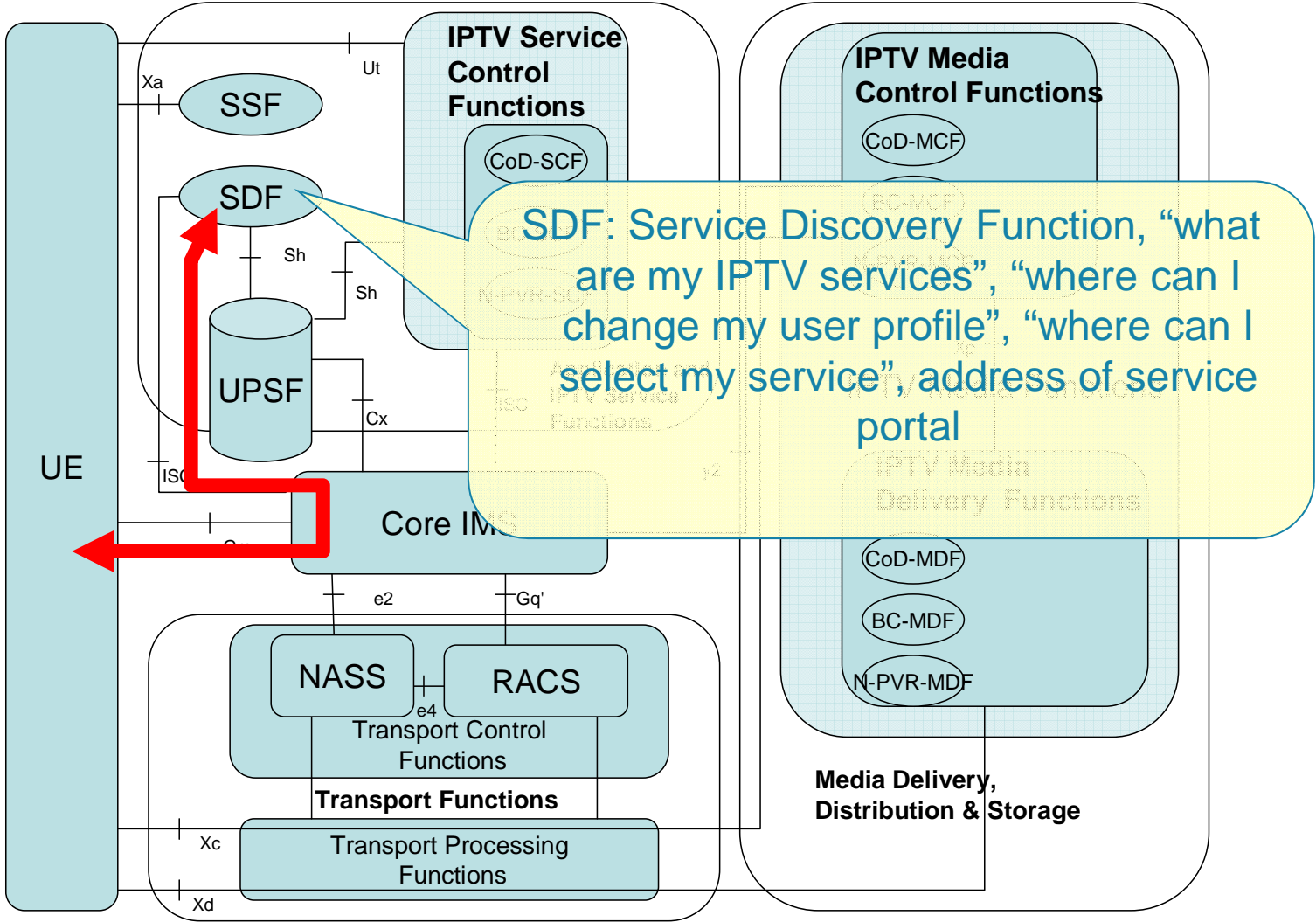
SCF and SDF:
dedicated SIP
application
servers for IPTV

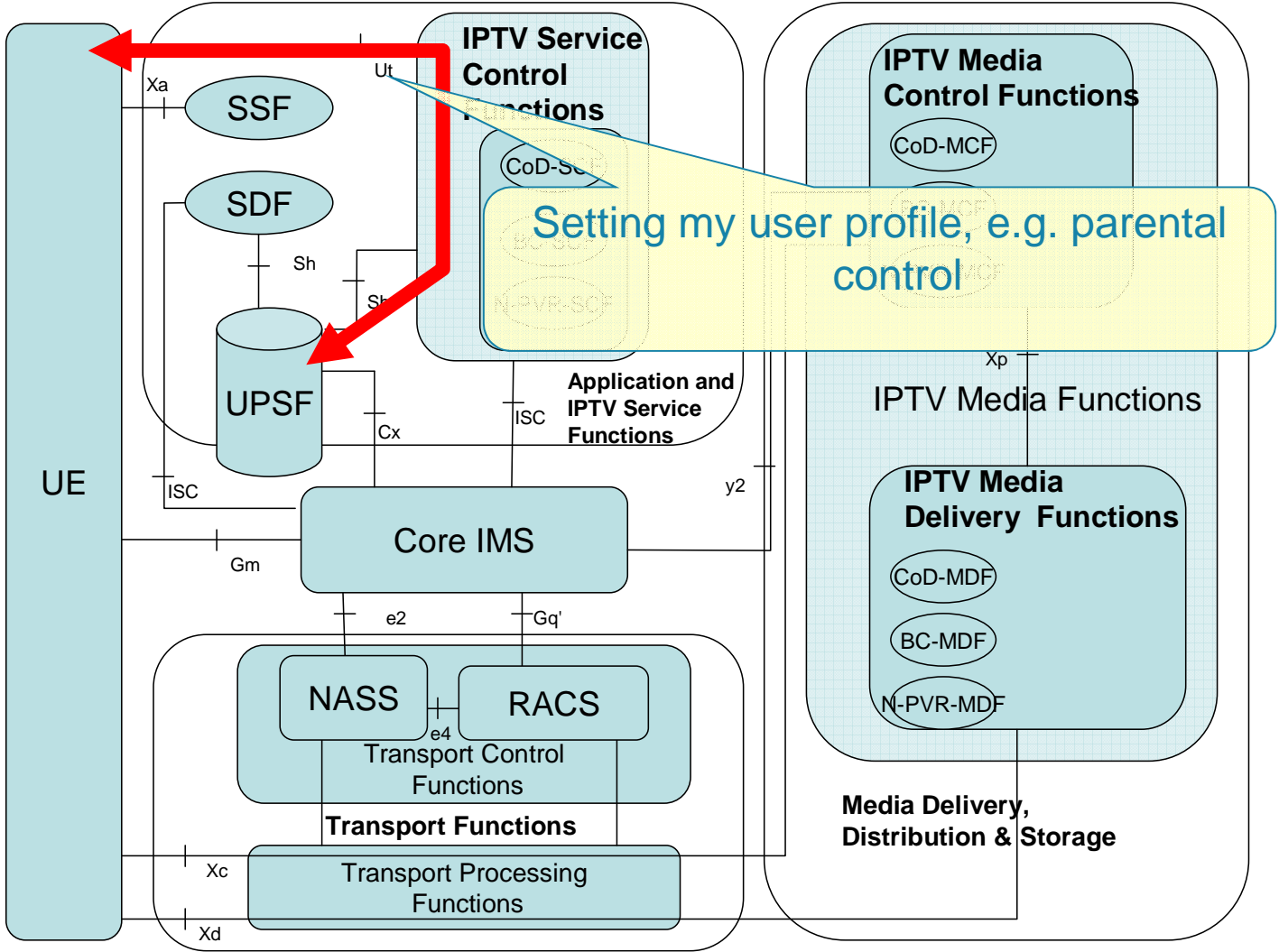
Core IMS:
Bunch of SIP
servers and User
Profile Server
"HSS"

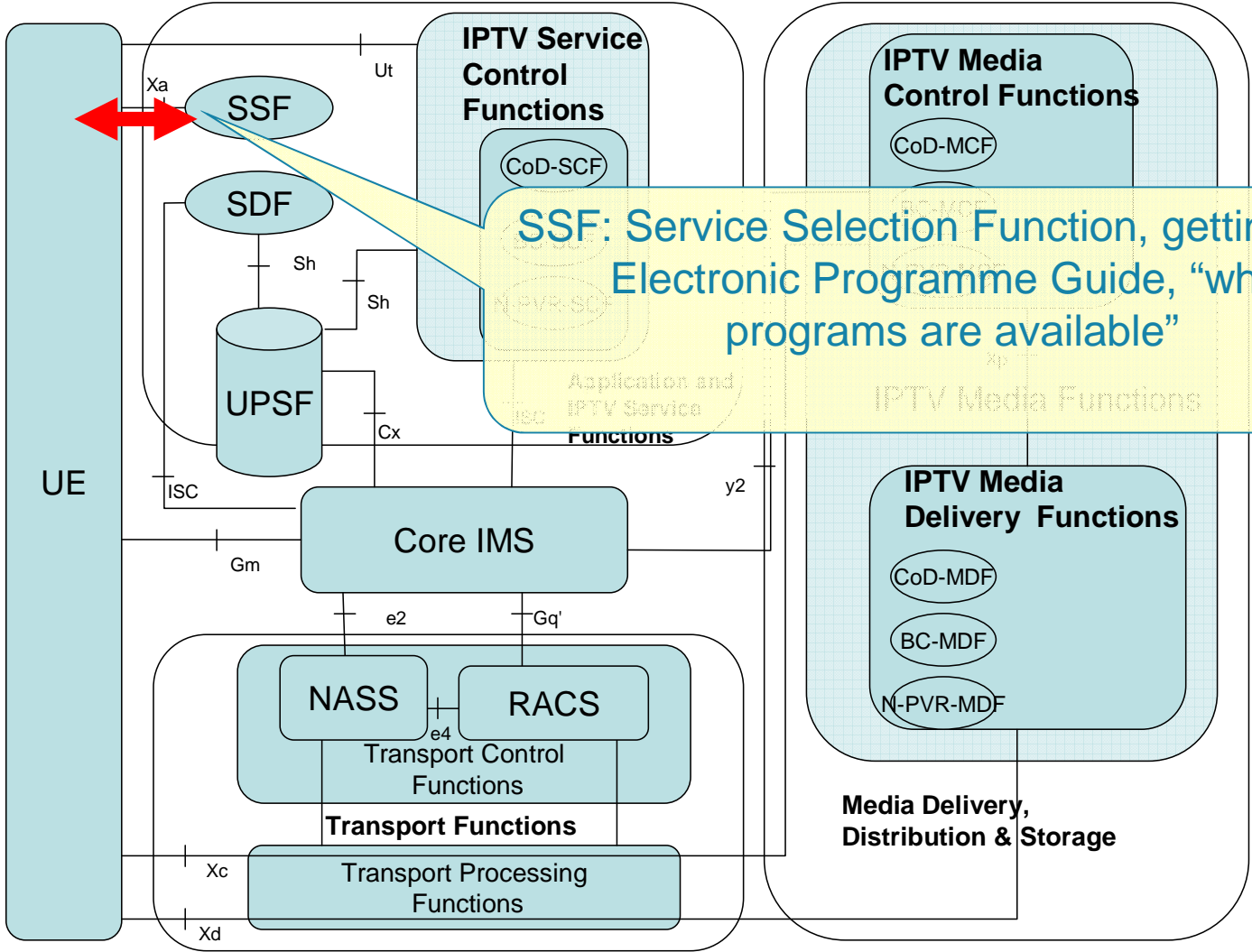
UE: User Equipment
Set-top box, Residential Gateway,
Home-Theater PC, ...







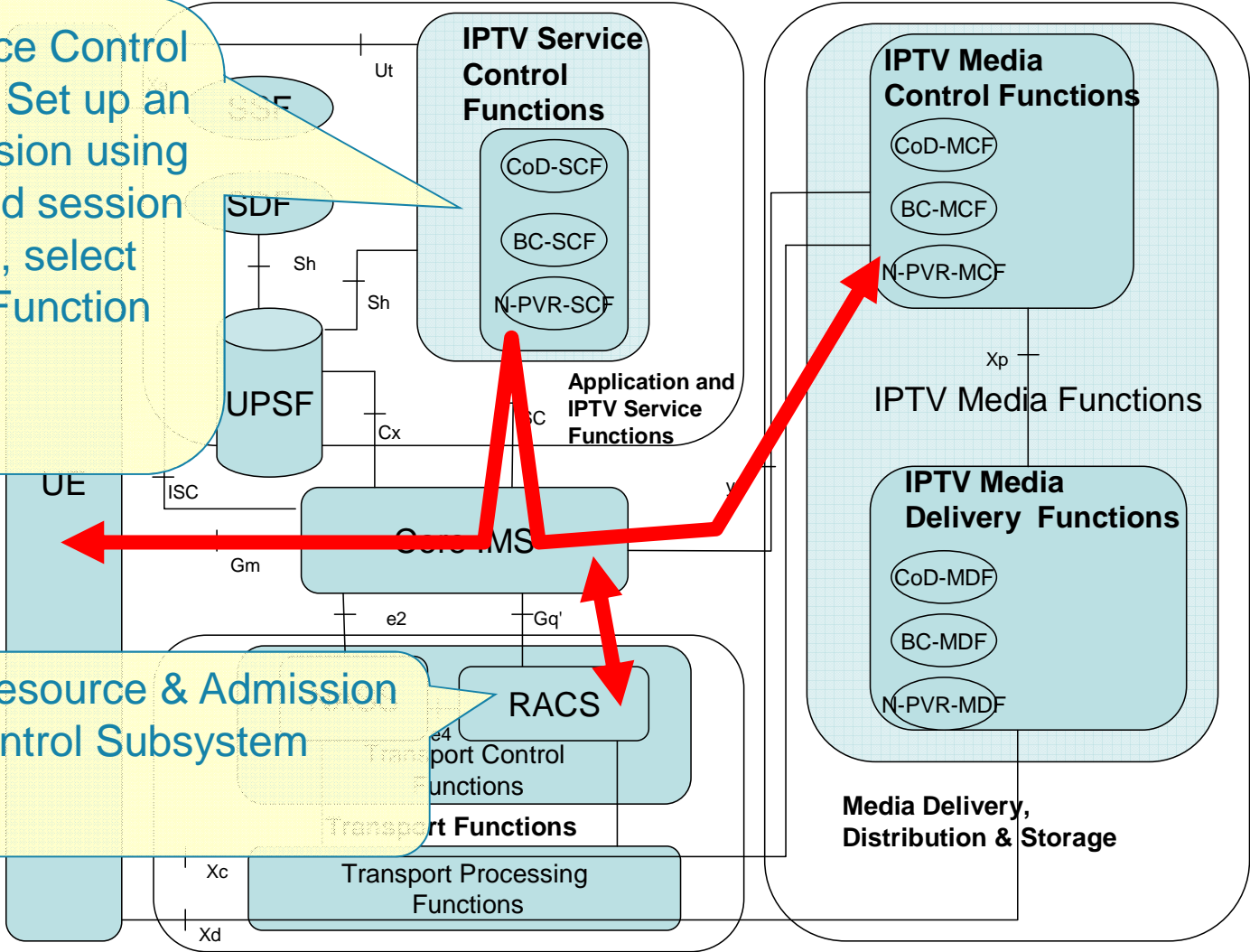




SSF: Service Selection Function, getting an Electronic Programme Guide, "what programs are available"

SCF: Service Control Function, Set up an IPTV session using SIP-based session control, select Media Function

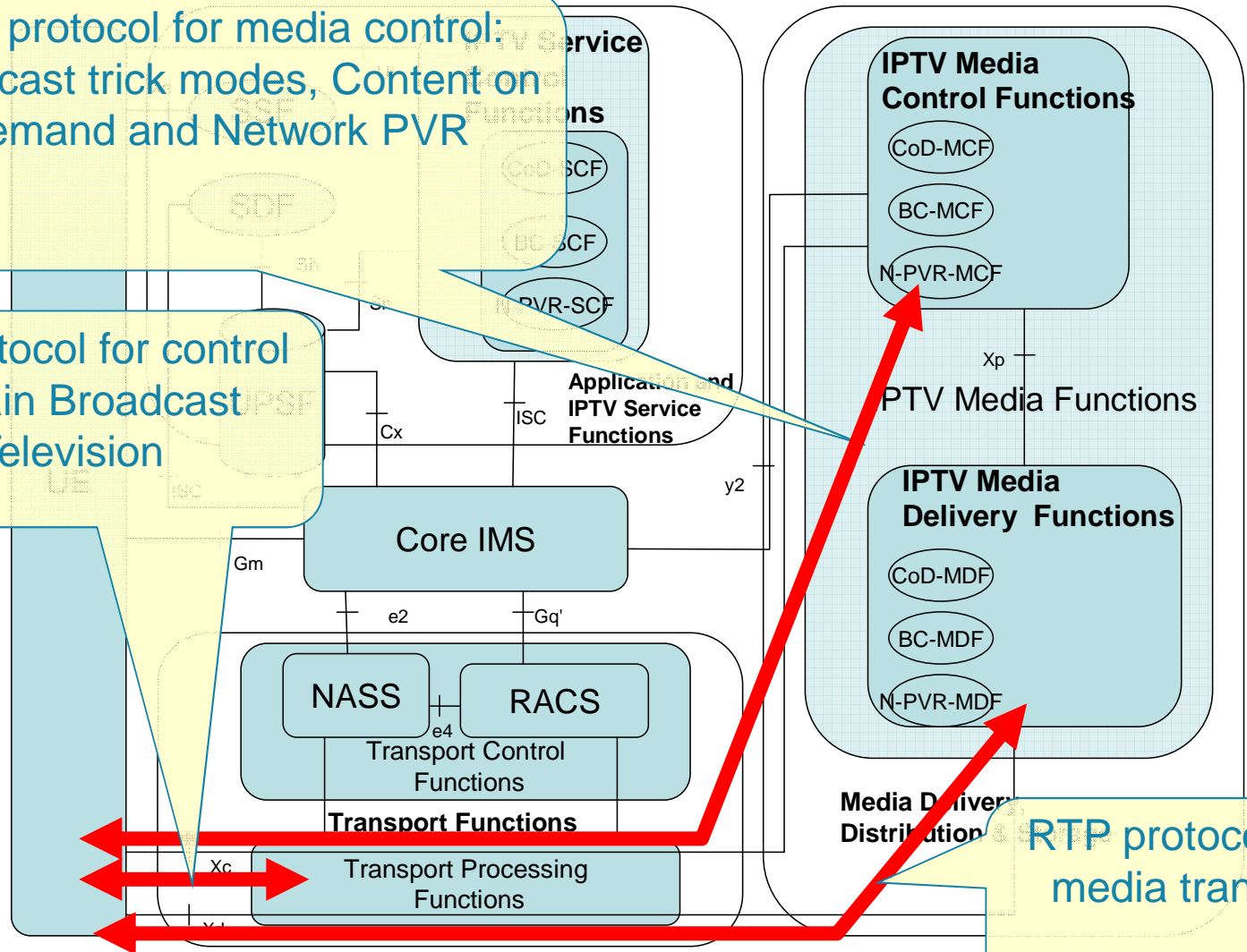
RACS: Resource & Admission Control Subsystem



RTSP protocol for media control:
Broadcast trick modes, Content on Demand and Network PVR

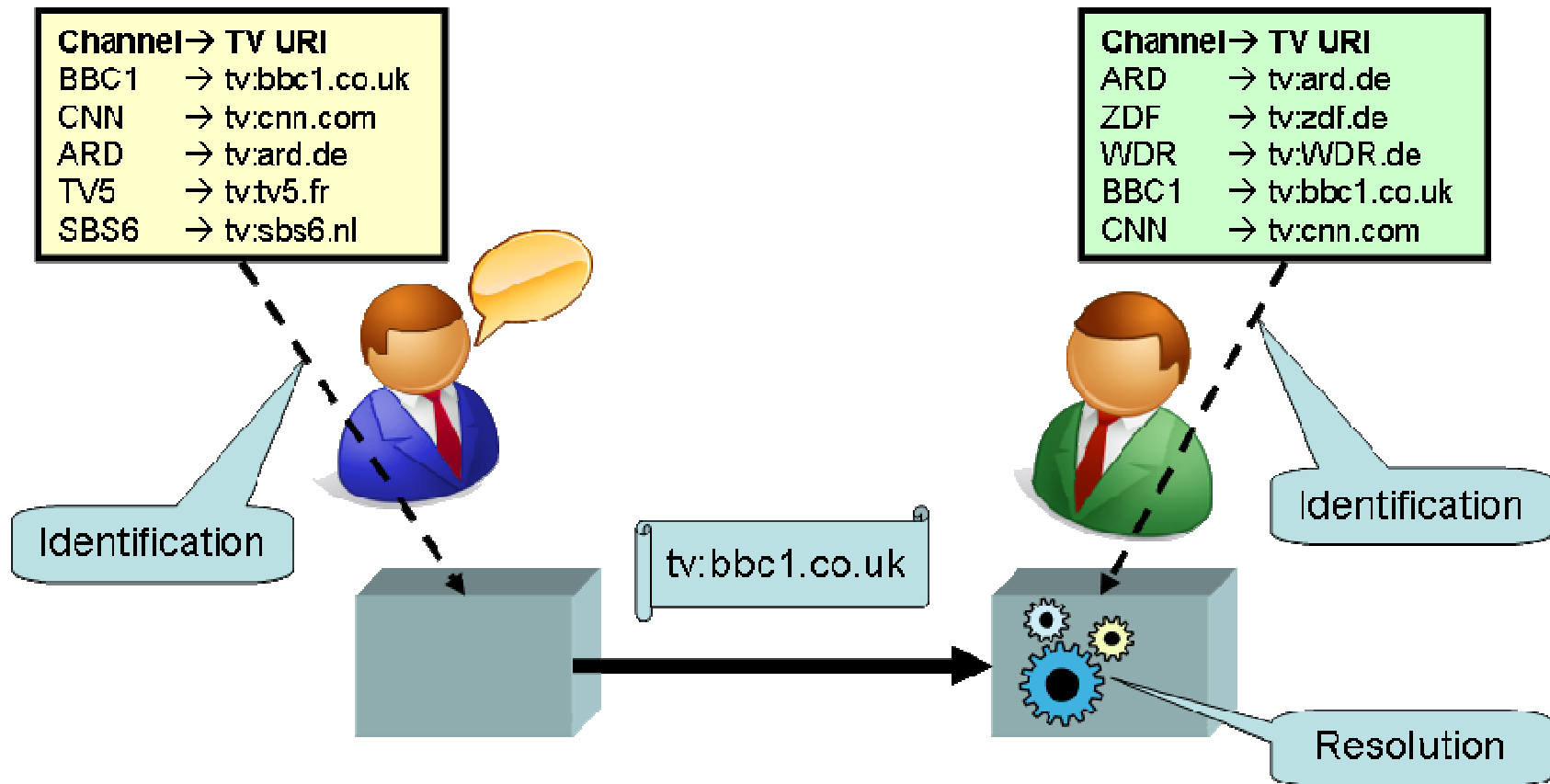
IGMP protocol for control of plain Broadcast Television

RTP protocol for media transport



TS 184 009: Rules for use of TV URI

□ TV URI: the “E164” for television channels



Note: company names or registered trademarks are used purely for examples, and there is no intent to limit the selection to specific commercial examples.