Future Internet Standards Workshop

ISO/IEC JTC1/SC6 Future Network
Working Group 7 – Part 6: Media Transport

Jesus Alcober (UPC/i2CAT, Spain)
Xavier Miguelez (UPC/i2CAT, Spain)
Fco. Javier Iglesias (Iglor SL, Spain)
Seoul, Korea

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Contents

1. Introduction

2. History of FN standardization in SC6 on Media Transport

3. JTC 1/SC 6's Considerations in FN Media Transport

4. Current status: Problem statement and requirements

5. Conclusion

Introduction

- Future Internet

    - Future of the Internet

- Future Network(s)

    - Network(s) of the Future

    - Term used in Standardization Bodies such as JTC 1/SC 6, ITU-T Focus Group-FN, ITU-T SG 13

    - ISO/IEC JTC1/SC6: Future Network

    - ITU-T FG-FN and SG 13: Future Networks

- Relevant Activities

    - USA: GENI, FIND

    - EU/FP7: FIRE, FIA,

    - Japan: AKARI

    - Korea: Future Internet, Future Network

Introduction

Std. No.	Title	Editors
29181-1	**Overall aspects**	M. K. Shin, J. Alcober
29181-2	**Naming and Addressing**	J. Xie, K. Zhang, H.K. Kahng
29181-3	**Switching and Routing**	J. Grant, H.K. Kahng
29181-4	**Mobility**	S.J. Koh, M. Roshanaei
29181-5	**Security**	H. Wang, Y. Liu (Acting)
29181-6	**Media Transport**	Francisco Iglesias, Sung Hei Kim, Xavier Miguelez
29181-7	**Service Composition**	Alberto J. Gonzalez, Jong-Hwa Yi, Ramon Matin de Pozuelo
29181-8	**Federation**	Myung-Ki Shin

- **SC 6/WG 7, September 2010 (London, UK)**

  - Project Subdivision of ISO/IEC 29181

    - 7 Multi-part document structure: 29181-1 ~ 7

      1: Overall Aspects

      2: Naming and Addressing

      3: Switching and Routing

      4: Mobility

      5: Security

      6: **Media Transport**

      7: Service Composition

  - Approved PDTR 29181-1, Future Network : Problem Statement and Requirements – Part 1: Overall aspects

    - Defines Media Transport as a general requirement for the Future Network (subclause 8.9)

    - Media transport is included as milestones for standardization of the Future Network

History of FN standardization in SC6 on Media Transport

- **SC 6/WG 7, February 2011 (London, UK)**

  - Developed updated WD texts of 29181-2(Naming and Addressing), 29181-3(Switching and Routing)

  - **First WD** texts of **29181-6(Media Transport),** 29181-7(Service Composition)

  - Initial proposal on new work on Federation of FN

- **SC 6/WG 7, June 2011 San Diego, USA)**

  - Developed **updated WD** texts of 29181-2(Naming and Addressing), **29181-6(Media Transport)**, 29181-7(Service Composition)

  - First WD text of 29181-4(Mobility), 29181-5(Security)

  - Approved new 29181-8(Federation) part and first WD text

- **SC 6/WG 7, September 2011 (Barcelona, Spain)**

  - Developed **updated WD** texts of 29181-2(Naming and Addressing), **29181-6(Media Transport),** 29181-7(Service Composition), 29182-4 (Mobility) and 29181-5(Security)

Std. No.	Title	Status
29181-6	**FNPSR Part 6: Media Transport**	**3rd WD**

- Text for consideration in next meeting (February 2012, China)

JTC 1/SC 6's Considerations in FN Media Transport

- **FN identified the high-level requirement of media transport**

  - PDTR 29181-1: Overall Aspects

- **Main goal of TR 29181-6: Media Transport**

  - Describes the problem statement and requirements for the Future Network in the perspective of Media Transport. This TR specifies:

    a) detailed description on the media transport requirements in the Future Network;

    b) identification and definition of services, basic and media services, which will fit the requirements for communications over heterogeneous environments supporting various user preference, for any kind of media content, either time-dependent or time-independent;

    c) functional architecture for media transport in the Future Network based on the micro-modularizing paradigm (RBA or atomic approach) able to generate, either in design-time or in run-time, a customized container for any kind of data or content to convey;

    d) requirements and functionalities of Media Aware Network Elements, which are intended to be nodes in the network to provide seamless media experiences to users;

- the lack of true interaction between the people and the media
- the lack of efficient search and retrieval mechanisms
- the lack of truly collaborative environments
- the disembodied and non-multimodal access to the content
- the gap between content (media) and senses
- the lack of emotional communication among users and communities

JTC 1/SC 6's Considerations in FN Media Transport: Requirements

- The content centric engineering
  - to deliver the best possible quality within the actual context of the user
- The content-centric network design
  - allowing users to access information transparently and with an enhanced findability, without knowing the place or address of the host.
- Design for tussle
  - supporting flexible business models in an open environment.
- Trustworthiness
  - ensuring security and privacy for all the stakeholders involved.
- Flexibility
  - allowing, for example, a user to fetch information divided into different locations.
- And those implies support for
  - any types of media contents
  - any types of media devices
  - identification of media content and media device
  - delivery of time-independent and time dependent media object
  - the cross-layer approach
 - any coding

- **Media transport**

  - Media transport is defined as the reference transport for the Future Network information

    - based on the modular paradigm of a customizable container

    - for either any kind of media content, both time-dependent and time-independent, or raw data, and

    - focused on defining services to fit the requirements for communications over heterogeneous networks supporting user preferences and their specific capabilities.

  - The media transport in the Future Network is based on the premises of simplicity and flexibility (evolvable) and is focused on high quality multimedia communications.

- **Media transport framework based on:**

  - service-oriented approach

    - for a flow-oriented context-aware network architecture

    - working in a connection-oriented mode,

      - although connection-less is allowed for particular sort of services,

    - where communications are composed in situ (using reusable components) according to the needs and requirements of the consumed service.
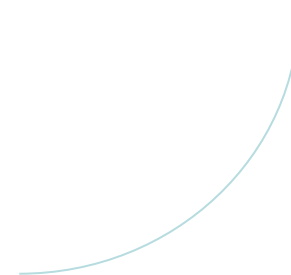
- **Service** classification

  - Media (belongs to the content realm)
    - services applied on the content (ie: content adaptation, scalability, etc.)
    - may be executed by the same peer or by another, usually Media Aware Network Elements

  - Basic (atomic)
    - individual functions commonly used in networking protocols (i.e. ACKs, sequence numbers, flow control, etc)

  - Composed
   - Combination of basic services and media services as just needed

JTC 1/SC 6's Considerations in FN Media Transport

Basic Services
- SN
- ACK
- TS

Media Services
- Adaptation
- Audio coding

Composed Services
- SN
- ACK
- Adaptation
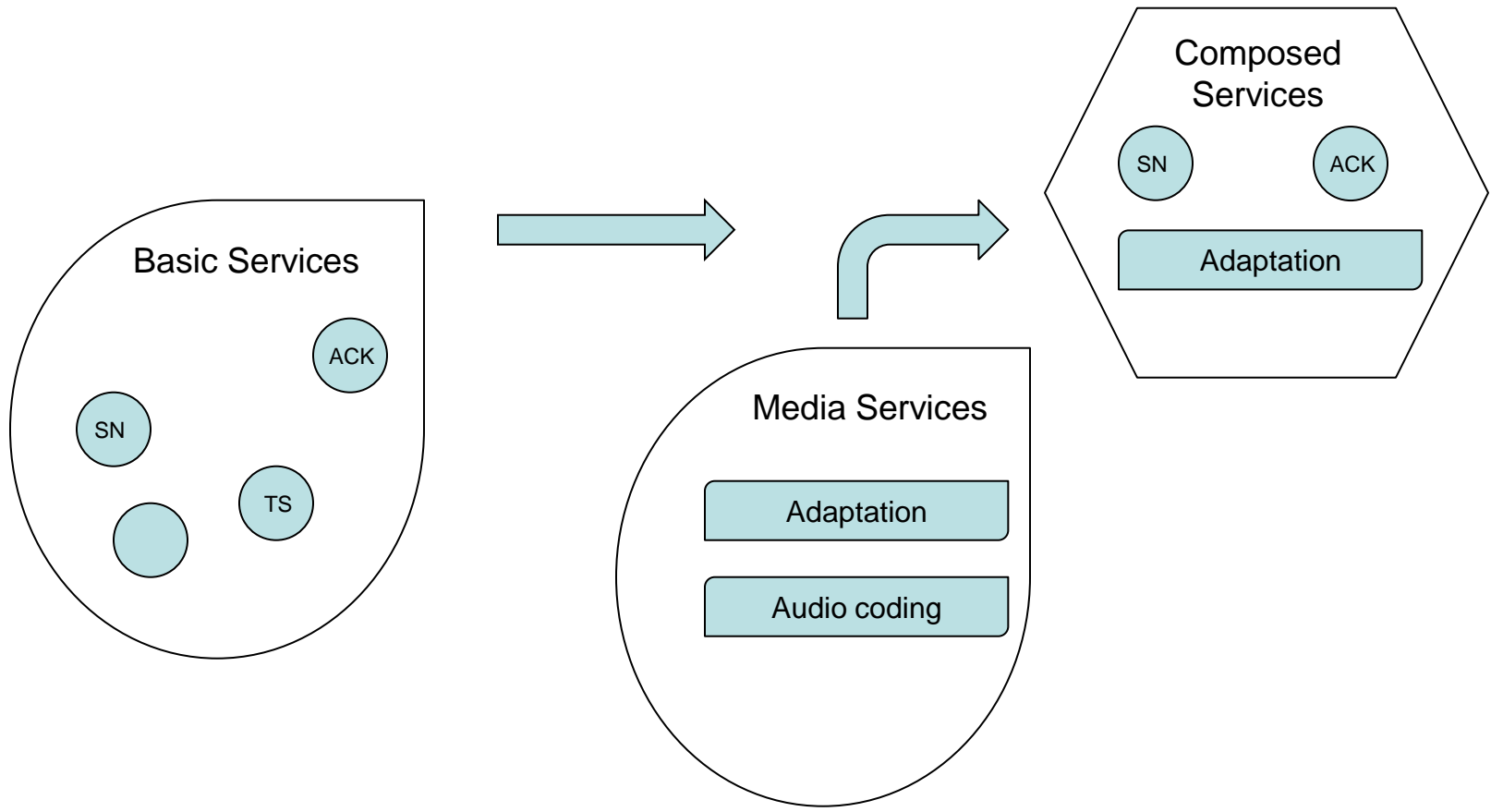
- **Container**

  - It is defined as the encapsulation structure for either data or content

  - Container is composed by a payload and one unique header which has two differentiated parts

    - Application Realm – header related to the application data
    - Network Realm - header more often variable along the route regarding to the underlying network

  - Container has attributes as header fields, which some are related to particular services, and others are general and specific for a sort of communication
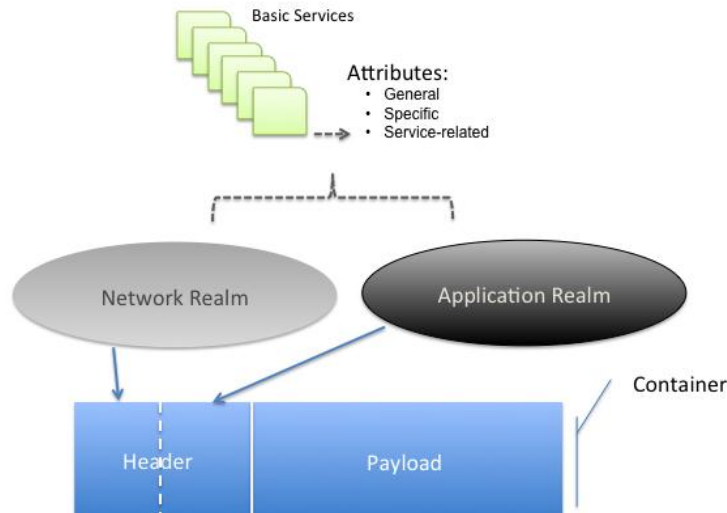
JTC 1/SC 6's Considerations in FN Media Transport: planes

- **Architecture consisted on two planes**

  - Control plane
    - in charge of the establishment, negotiation, follow-up, and the tearing-down of a flow connection, and enables management tasks.

  - Data plane
    - in charge of the data transmission (PDU generated from the services negotiated and relay)

16
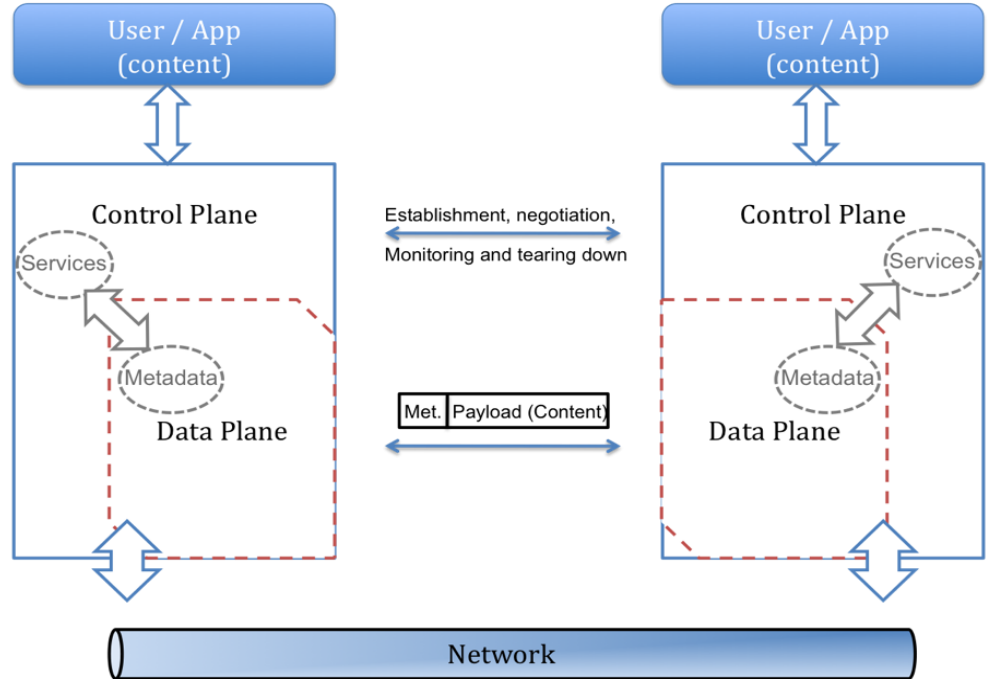
- **What is the Future Network view for Media Transport?**

  - Simply, Media represents what are senses in the real life,

  - it is the representation of them in the digital world, and

  - Media Transport tries to enable distant communication as it was face to face
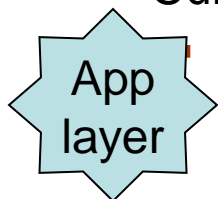
Use Cases I - Multistreaming

- **HD Multiparty Videoconference**
    - involves several participants who may have as wide variety of capabilities as basically heterogeneous networks and devices
    - one solution → enabling scalability (MDC) → multiple streams
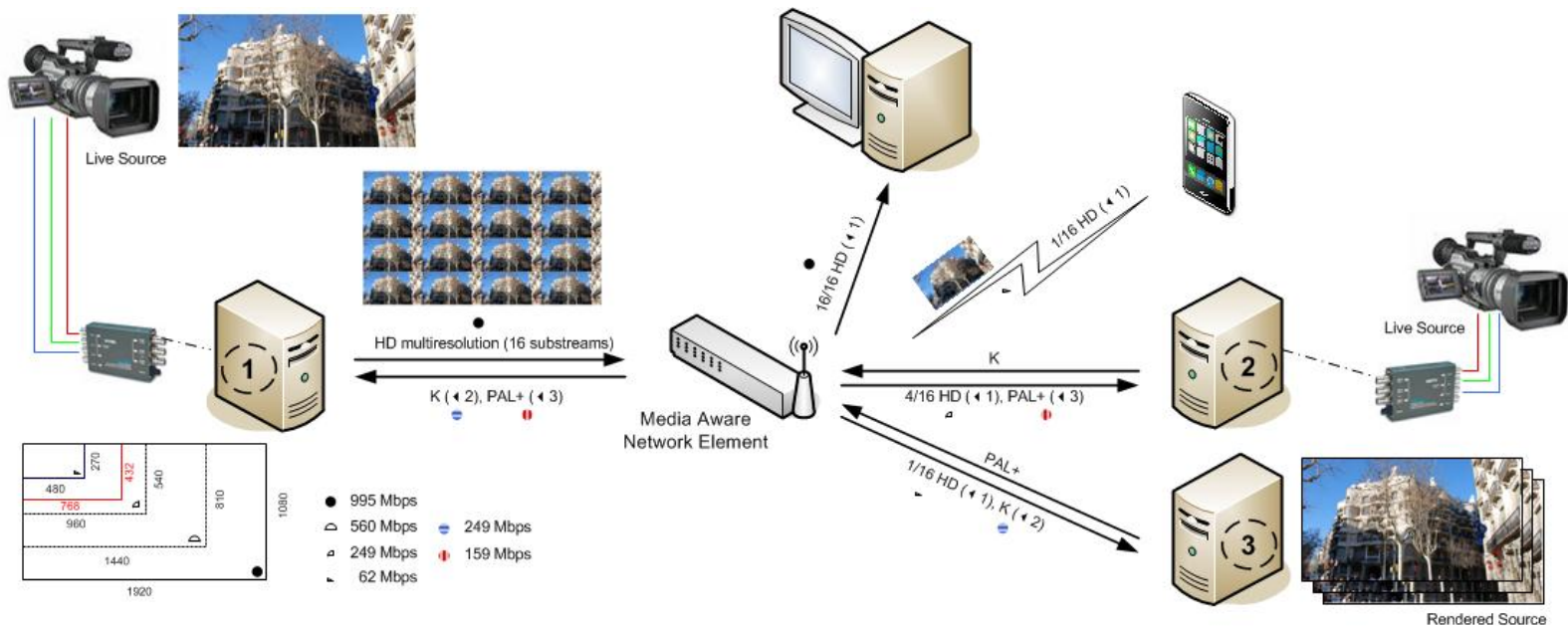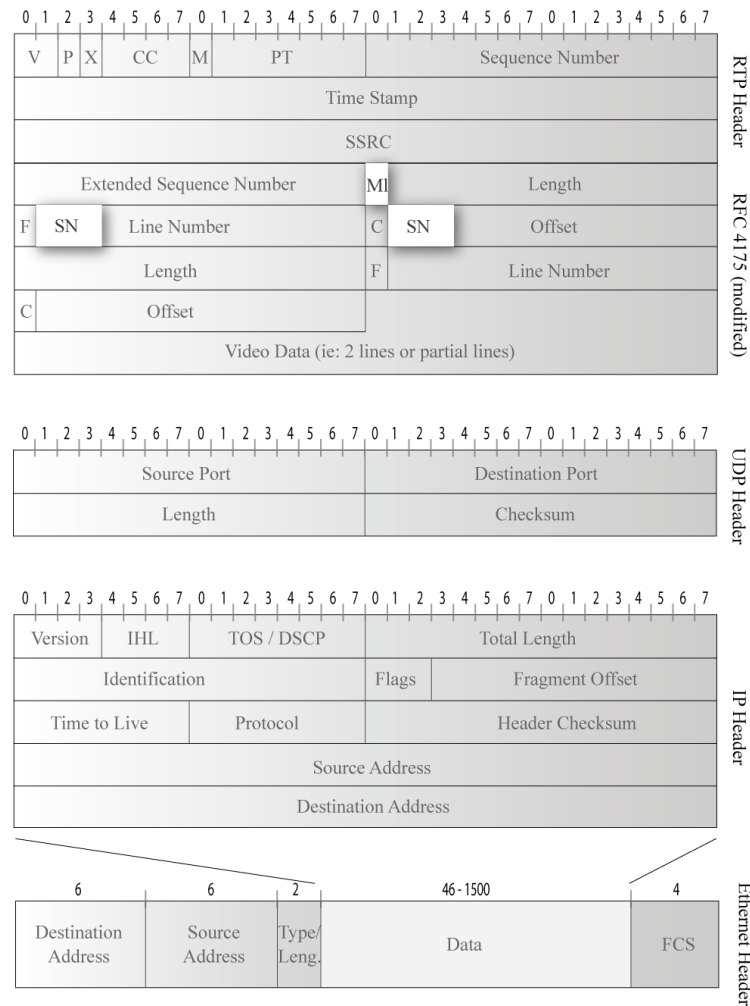
Use Cases I - Multistreaming

- **Current network**

  App layer

  - control plane to establish, maintain and tear-down the call (SIP)
    - determines the capabilities of the parties in the call, entailing which kind of media will be issued
  - data plane to transport the multimedia data.
    - RTP/UDP/IP stack with either some sort of extra signalling to control the synchronization, or an extension to the RTP header to differentiate streams
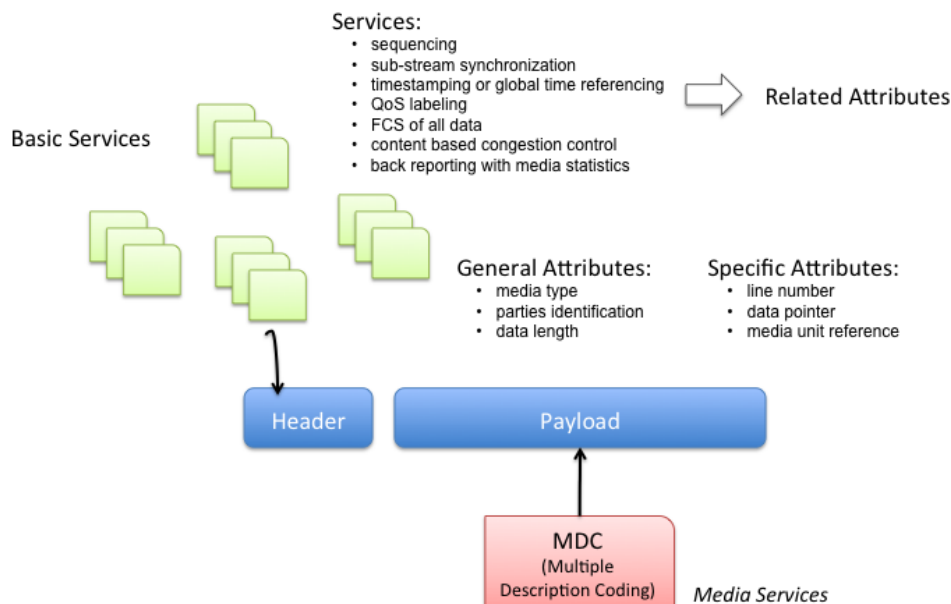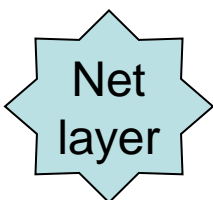

19

Use Cases I - Multistreaming

- **Future Network**

  control plane is also needed to establish, negotiate, monitor and tear-down
    - determines the capabilities of the parties in the call, thus which kind of basic and media services will be needed for network protocols
  - **data plane**
    - Relaying the PDU (made up of metadata from basic services and the payload carrying the content)

Net layer

Services:
- sequencing
- sub-stream synchronization
- timestamping or global time referencing
- QoS labeling
- FCS of all data
- content based congestion control
- back reporting with media statistics

→ Related Attributes

Basic Services

General Attributes:
- media type
- parties identification
- data length

Specific Attributes:
- line number
- data pointer
- media unit reference

Header   **Payload**

MDC
(Multiple Description Coding)
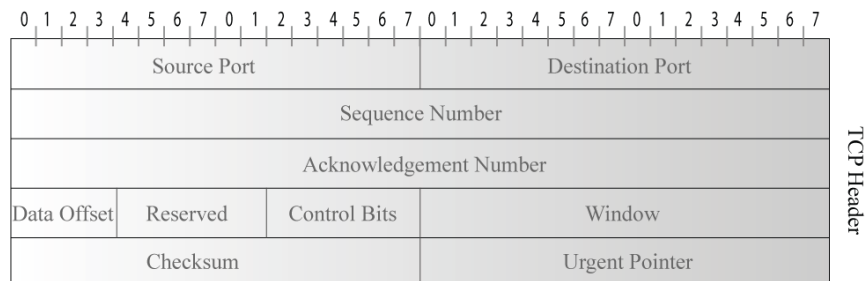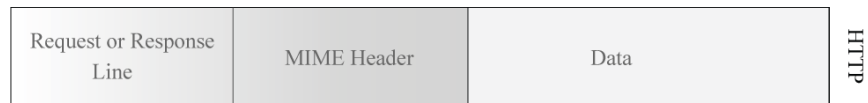
Media Services

Use case II – web browsing

- Current network
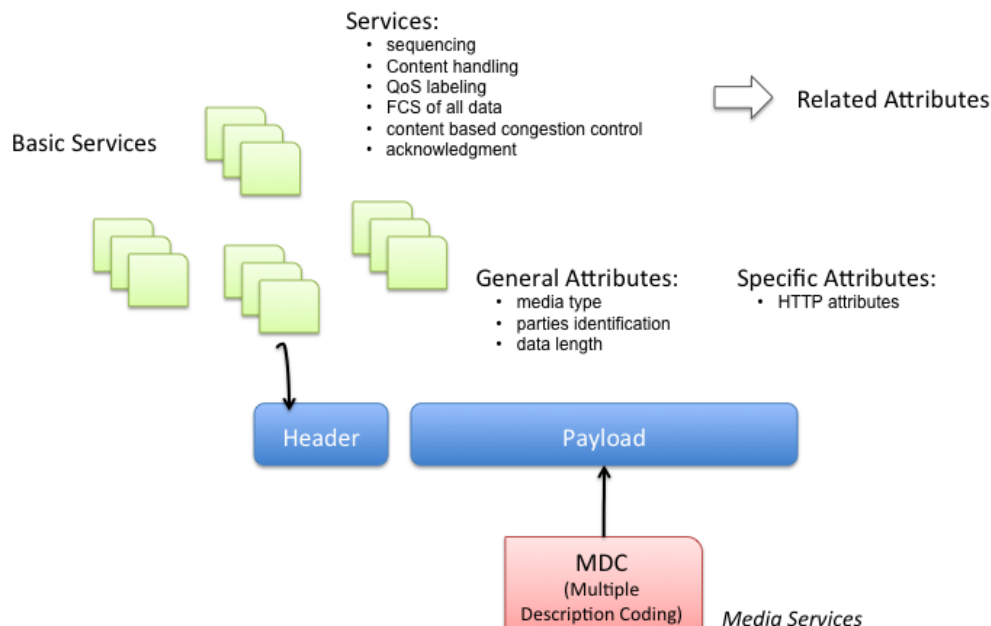 - Incumbent stack HTTP/TCP/IP

Control at L4

- Reliable communication at transport layer
  - Connection-oriented
  - Strict flow and congestion control
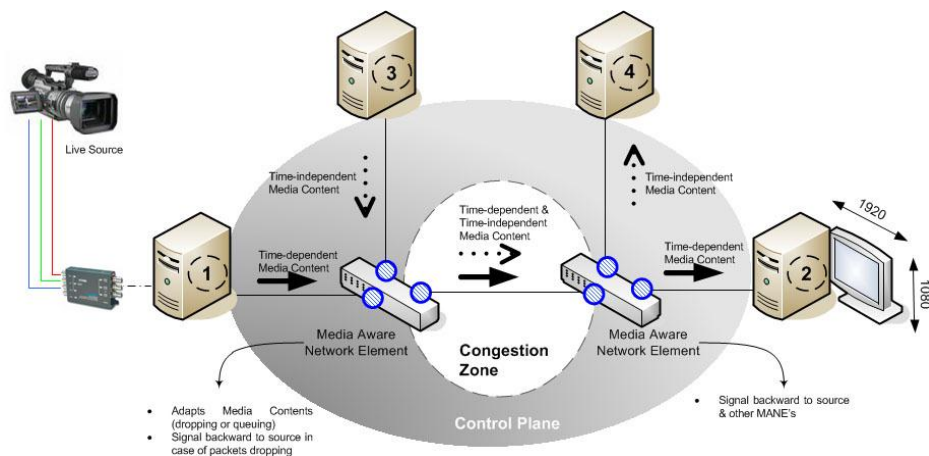- Best-effort at network level

21
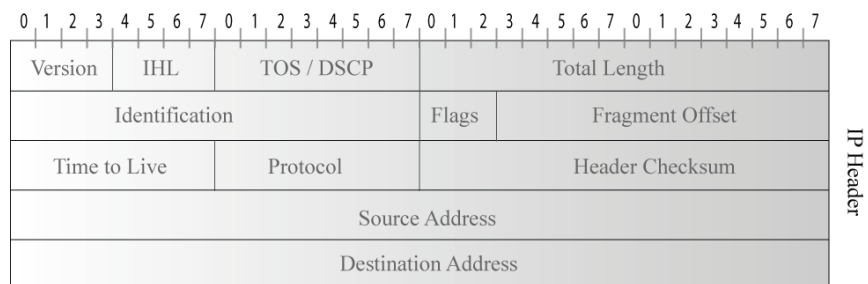
Use case II – web browsing

- Future Network
  - control plane is also needed to establish, negotiate, monitor and tear-down
    - services to provide an asynchronous reliable data transfer
  - data plane

Services:
- sequencing
- Content handling
- QoS labeling
- FCS of all data
- content based congestion control
- acknowledgment

Basic Services

Related Attributes

General Attributes:
- media type
- parties identification
- data length

Specific Attributes:
- HTTP attributes

Header

Payload

MDC
(Multiple Description Coding)
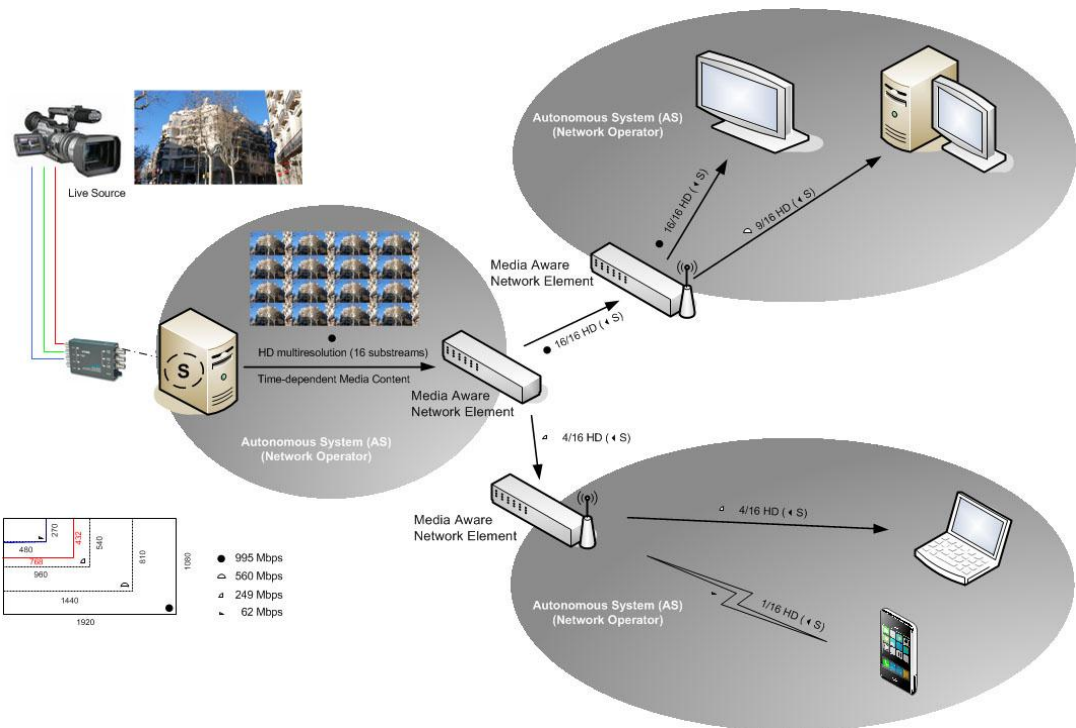
Media Services

22

Use case III – Media Aware Network Element

- Content based congestion control
  - in case of congestion MANE's reacts adapting media contents
    - time-independent media
      - queued and sent at bursts instead of following a continuous stream.
    - time-dependent media
      - may be performed different actions depending on the capabilities of the MANE and the content itself. ie:
        » dropping particular packets of an scalable content
        » adapting the content to the network status
        » a signal of congestion is sent backward to notice to the source.

23

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- Decision-making
  - Context-aware element in charge of deciding over media content
    - Scalability by multistreaming – which streams are forwarded
    - Adaptability – adapt the media to particular context
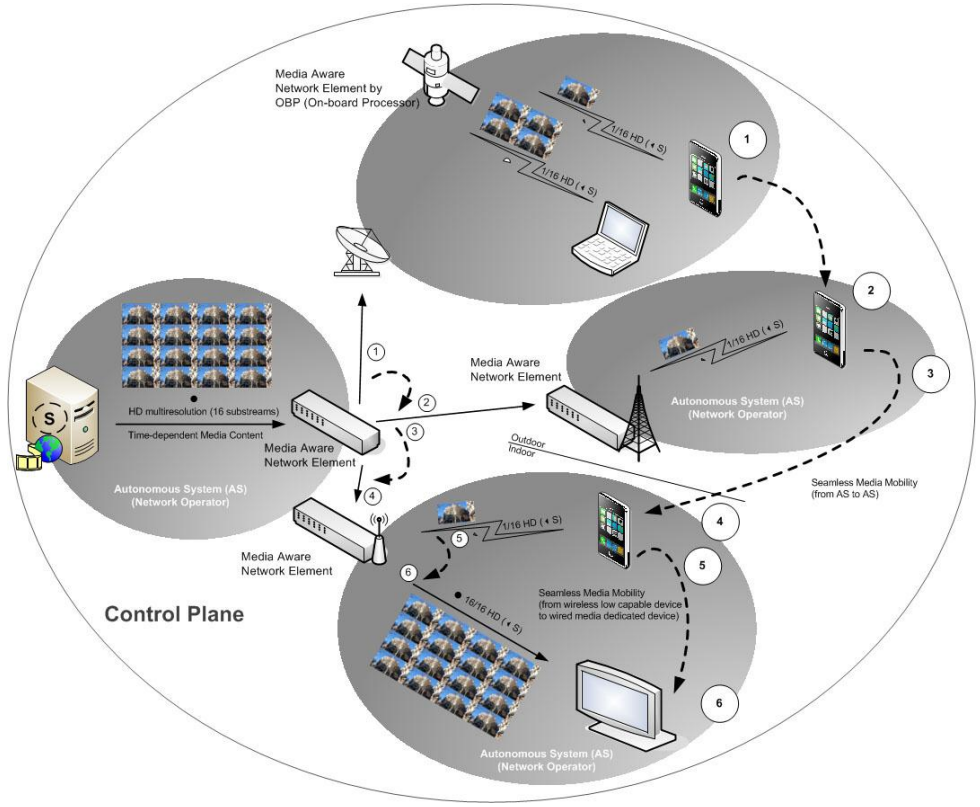 - MANE's within an autonomous system (single operator) or amongst them

Element in charge of deciding over media content

24

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- Seamless-mobility
  - Context-aware element in charge of performs media mobility
  - MANE's within an autonomous system (single operator) or amongst them

25

Conclusion

- Activity started in Barcelona (Spain) January 2010

- Formally approved in London (UK) September 2010

- Currently working in TR 29181-6 Media Transport: Problem statement and requirements

  - 3rd Working draft (Barcelona, Spain, September 2011)

- Media is one of the key issues in FN evolution

  - Universal container of content data

Thank you!

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Questions?

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