

대화형 인터넷 방송 기술  
- SMIL & MPEG-4 -

임 영 권

주식회사 넷앤티비

young@techway.co.kr



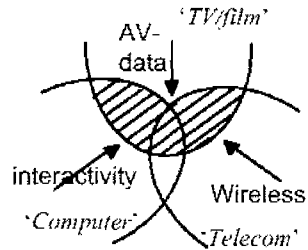
*What SMIL stand for?*

Synchronized Multimedia Integration Language



*The Goals of MPEG-4*

- Interactivity
  - Content-based
  - Random access
- Universal Access
  - Access across different networks
  - Error-prone environments
  - Scalability based on objects
- Natural and Synthetic materials
  - SNHC (Synthetic-Natural Hybrid Coding) group in MPEG
  - Mixing synthetic and natural objects in the same scene
- IPMP (Intellectual Property right Management and Protection)



*SMIL example (I)*

Top Story:

Growth of the World-Wide Web

Amsterdam

The screenshot shows a web page layout. On the left, there is a line graph with a rising curve. On the right, there is a photograph of a cityscape, identified as Amsterdam. The text 'Amsterdam' is written below the photo.

Graph appears during spoken commentary

**net&tv**

*SMIL example (II)*

Top Story:  
Growth of the  
World-Wide Web

First video finishes, second video plays

**mp** 5

**net&tv**

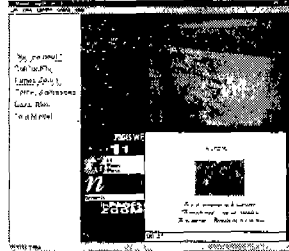
*SMIL example (III)*

Top Story:  
Growth of the  
World-Wide Web

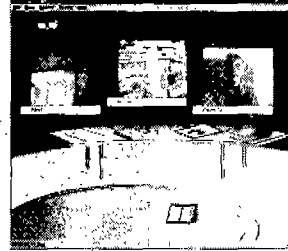
At any point during the video the viewer can request extra information.

**mp** 6

*Example of an MPEG-4 Scene (I)*



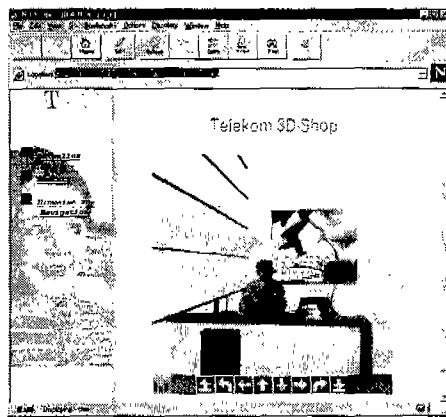
2D Audio-visual scene  
Audio and Video + Scrolling Text  
and Still Images



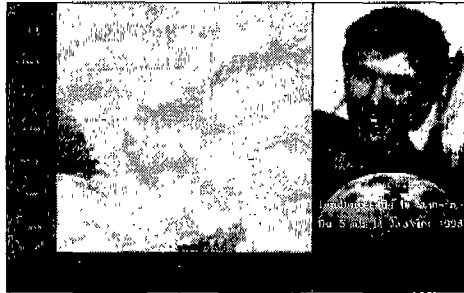
2D Audio-visual scene  
Audio and Video + Still Images

*Example of an MPEG-4 Scene (II)*

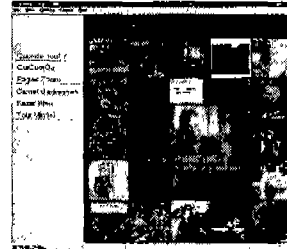
3D Audio-visual scene  
3D World + arbitrary shaped  
video + still images + 3D  
Objects



*Example of MPEG-4 Scenes (III)*

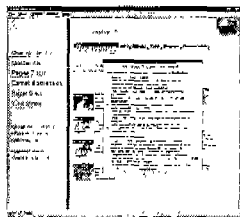


2D Audio-visual scene  
Animated Text+ Video + Still Images

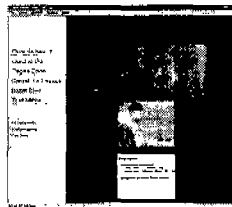


2D Audio-visual scene  
Audio and Video + Still Images

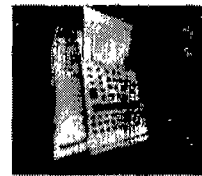
*Example of MPEG-4 Scenes (IV)*



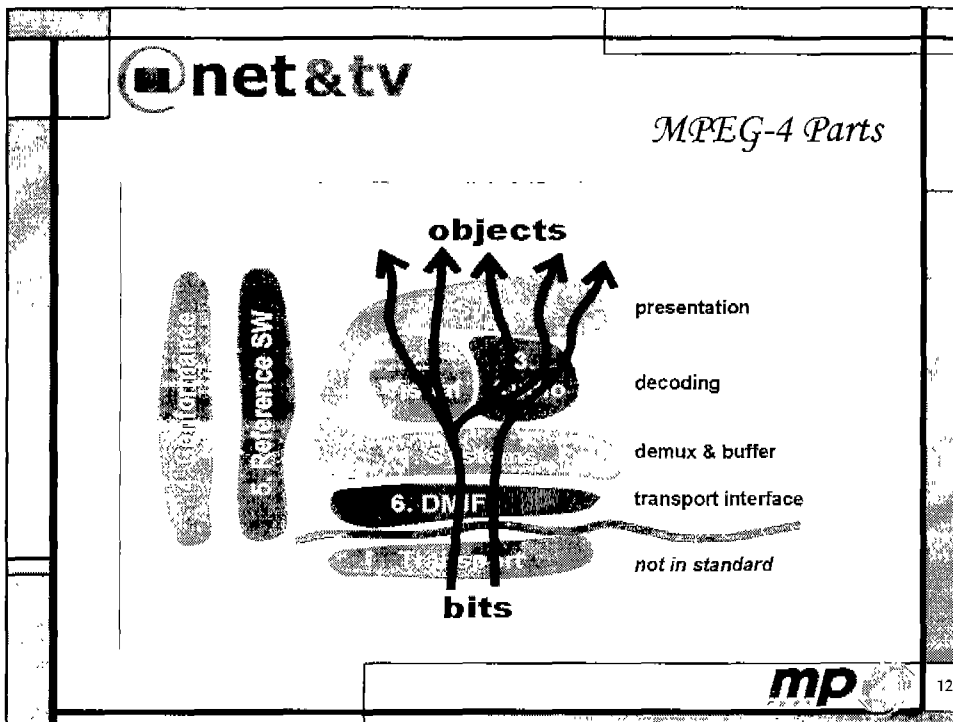
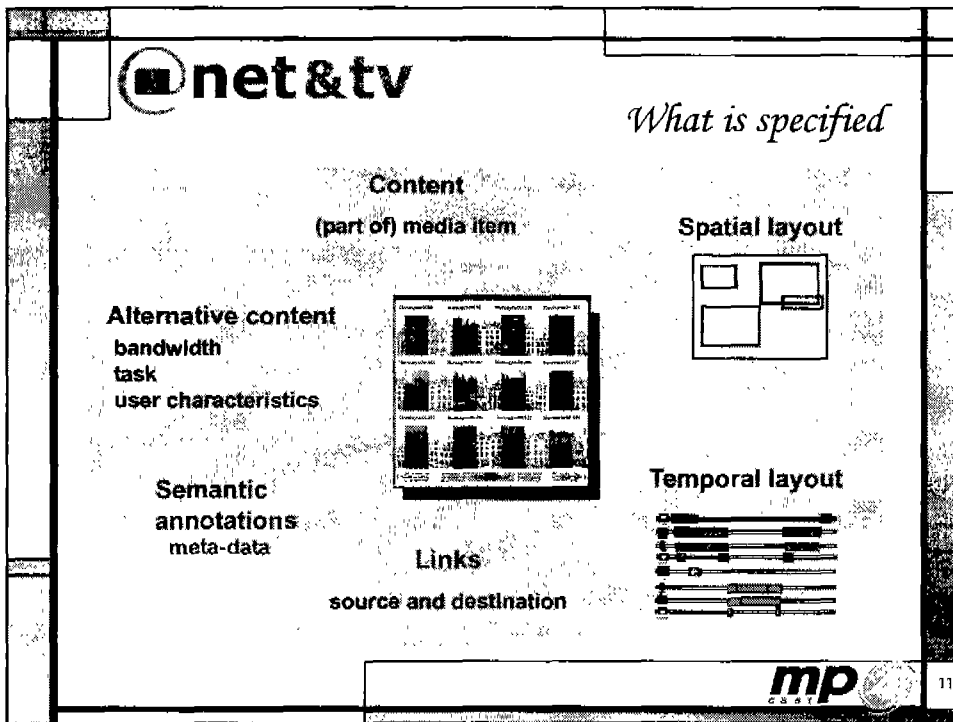
Web-like MPEG-4 Scene

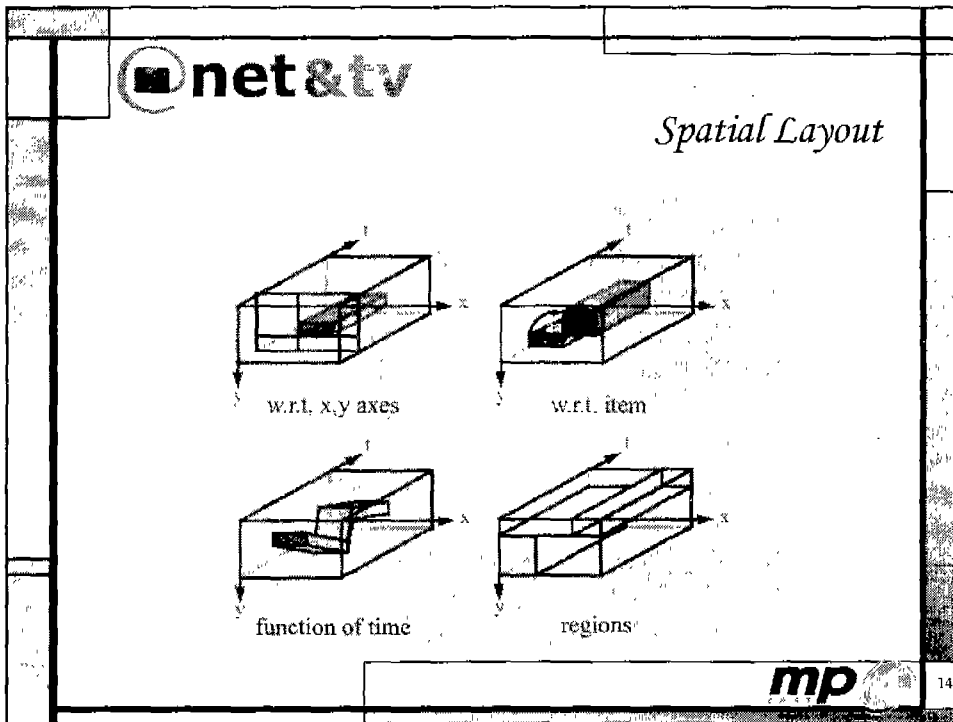
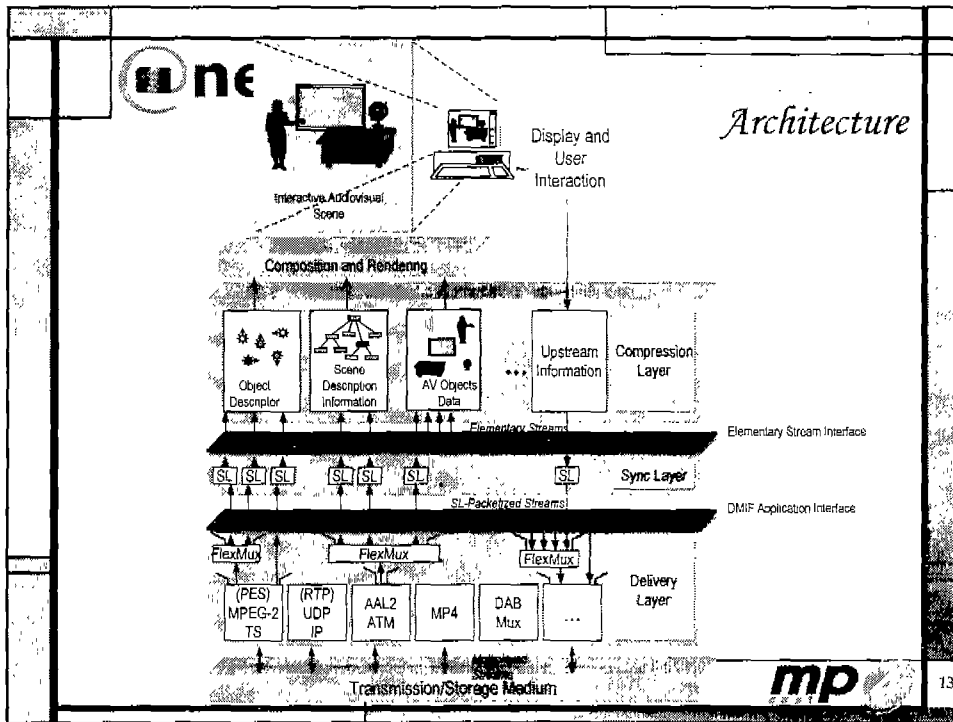


Multi audio and video  
MPEG-4 Scene with text

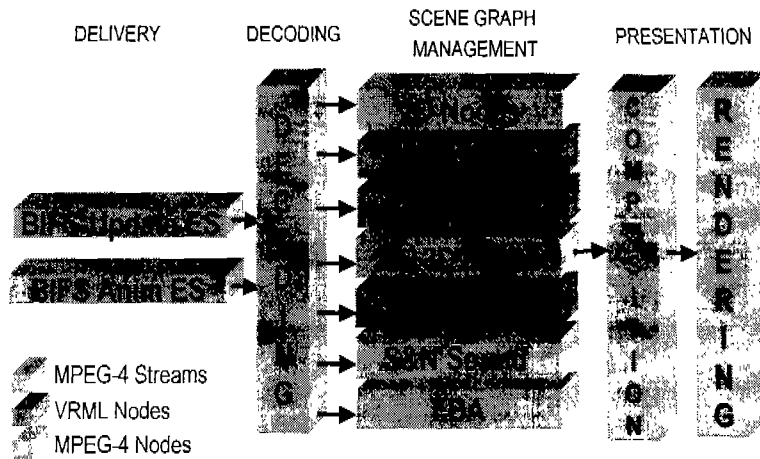


Scene with Face Object





*BIFS contents in MPEG-4 system*

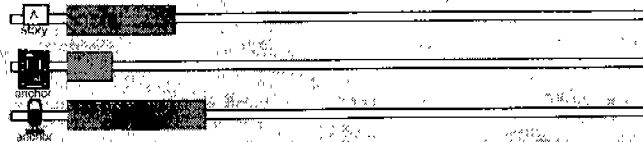


*BIFS Scene Compression*

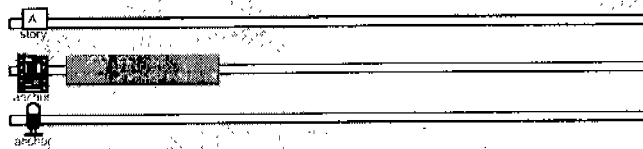
- BIFS Scene
  - Up to 25 time less than VRML-like text files
  - Context dependency
  - Hierarchical, linear quantization of scene data
  - Differential multiple fields coding and mesh coding integration (v2)
- BIFS-Anim
  - Up to 30 compression gain for animation contents
  - Linear quantization
  - Predictive coding (including rotation and normals)
  - Adaptive arithmetic encoding



■ `<par>`



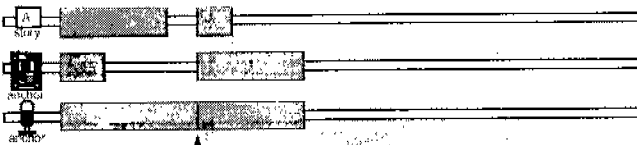
■ `<seq>`



```

<seq>
  <par>
    <text src="leader_title.html" region="m_title" dur="5s" />
    <video src="cnq.mpv" region="V-Main" />
    <audio src="cnq.aiff" region="music" />
  </par>
  <par>
    <text src="story_title.html" region="m_title" dur="2s" />
    <video src="anchor.mpv" region="V-Main" />
    <audio src="anchor.aiff" region="music" />
  </par>
</seq>

```



**net&tv** *Synchronization of media*

- Time line ("object time base") for the scene
- Scene description stream with time stamped BIFS access units
- Object descriptor stream with pointers to all other streams

---

- Video stream with (decoding & composition) time stamps
- Audio stream with (decoding & composition) time stamps

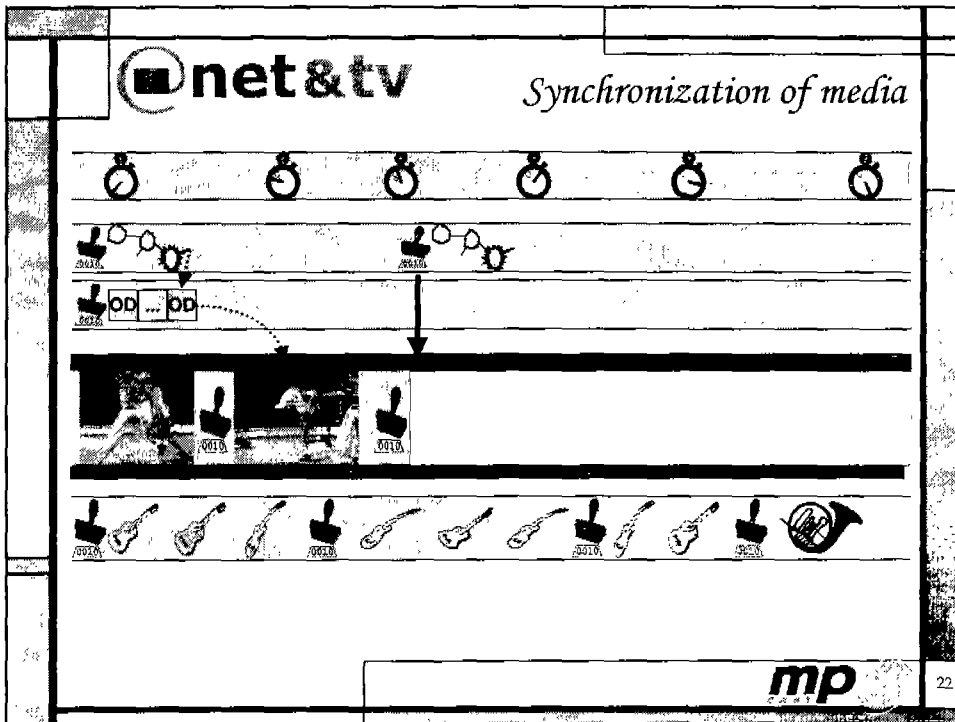
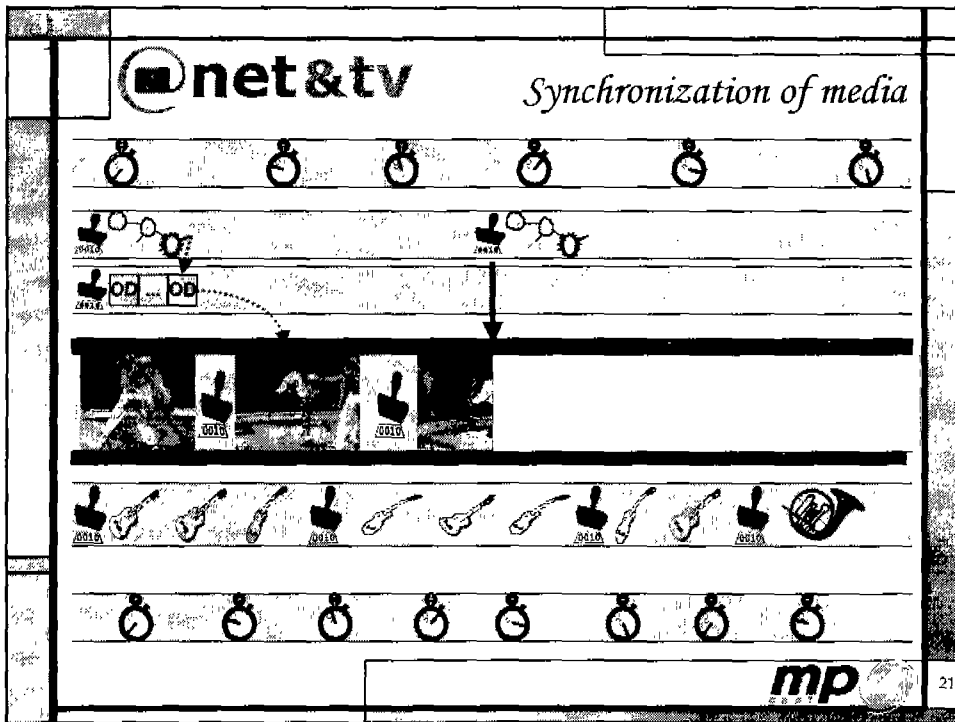
---

- Alternate time line for audio and video

**mp** 19

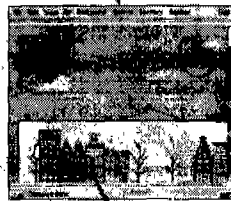
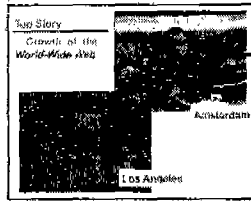
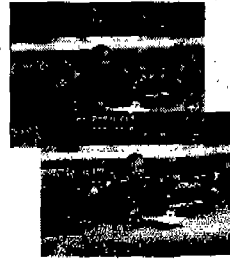
**net&tv** *Synchronization of media*

**mp** 20



- switch
  - At most one of the children of a switch element is played.
  - The first acceptable element is chosen, so ordering should be best first.


```
<switch>  
<audio system-bitrate="44000" src="hi-res.aiff" />  
<audio system-bitrate="16000" src="low-res.aiff" />  
</switch>
```

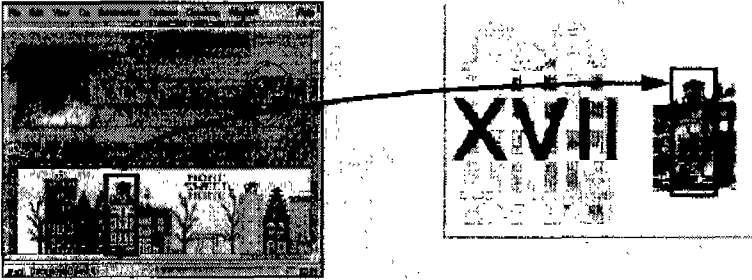



element to presentation


element to element

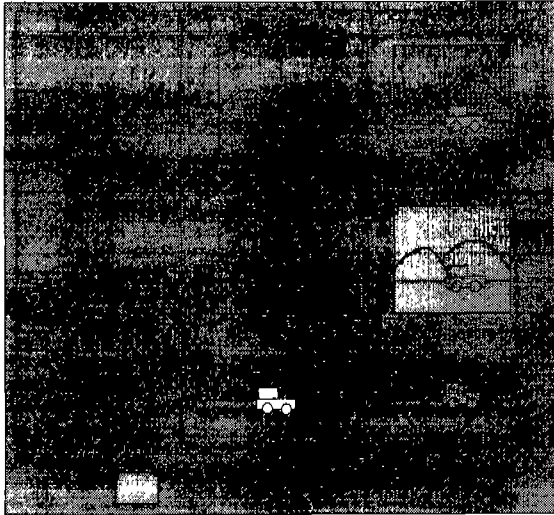



 *Areas for source and destination of a link*

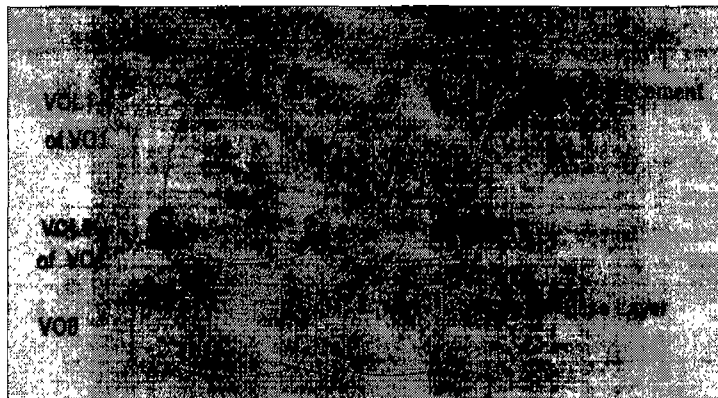


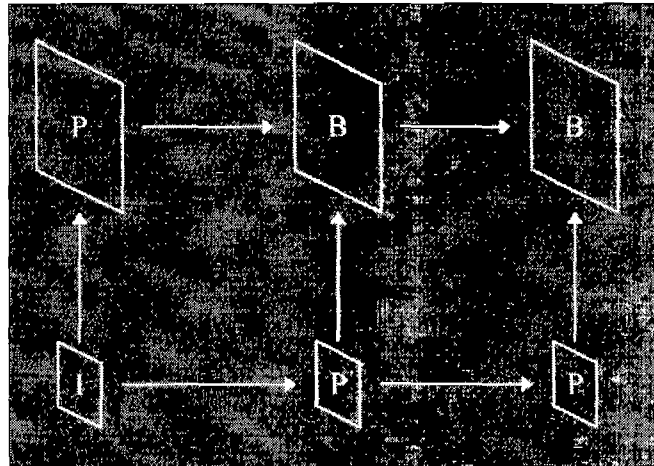
 25

 *Enhancement type*



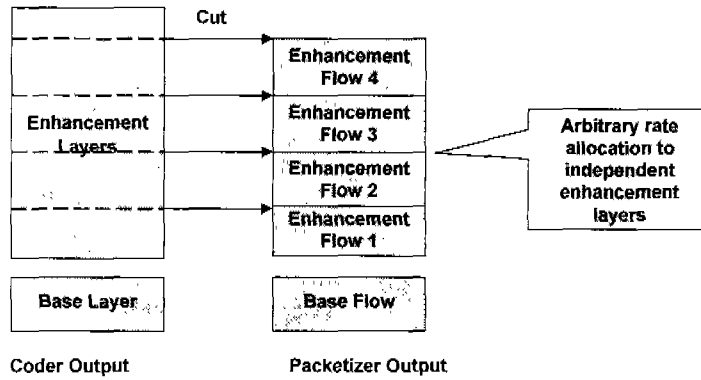
 26



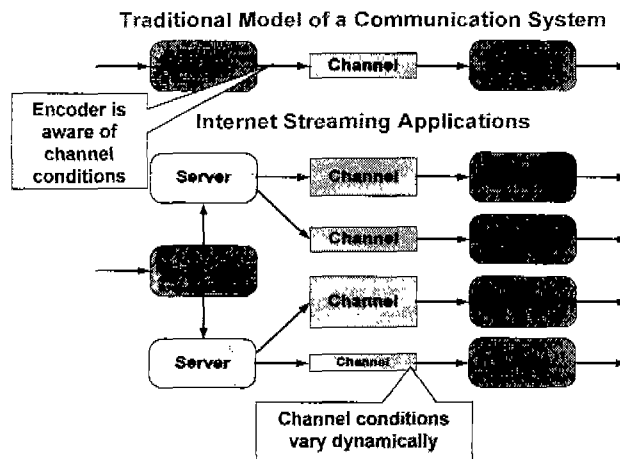


- Multi-level SNR (quality) scalability
- Separation of encoding and rate allocation
- Graceful degradation of quality under
  - network losses or bandwidth variation
  - limited decoding power
- Multicast and Statistical Multiplexing
- Tailoring of rates without transcoding

*Multi-Level Scalability*



*Encoder/channel separation*







**RealNetworks**

- RealPlayer 8 — time-focussed media types
- Current SMIL 1.0 support, anticipated SMIL Profile support
- 3rd party creation tools
- Clear Leader for SMIL Players



**ORATRIX**

- GRINS authoring environment and free player
- current SMIL 1.0 and anticipated SMIL Profile authoring
- current free player for SMIL Profile



**Microsoft**

- Internet Explorer 5.5 supports XHTML+SMIL prototype
- support for XHTML+SMIL standard anticipated with its release



**Apple**

- Quicktime 4.1 supports SMIL 1.0

- Microsoft
- Optibase
- CSELT
- envivio
- iVast
- mp4cast

- MPEG-4 인터넷방송 솔루션 컨소시엄
- Goal : Integrated end-to-end solution for streaming MPEG-4 content over IP networks
- Members
  - (주)넷앤터비
  - 넷코덱(주)
  - (주)새롬기술
  - (주)엠펙솔루션
  - (주)테크웨이
- [www.mp4cast.org](http://www.mp4cast.org)

*Thank you!*

*Questions and Answers*