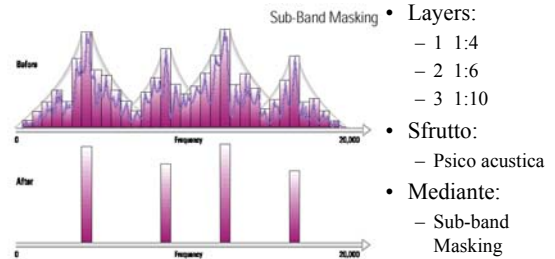
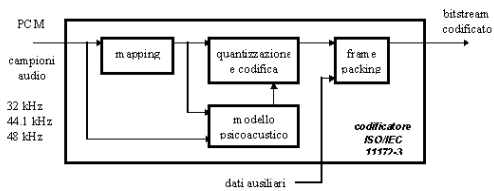


## Compressione video 2

## Audio

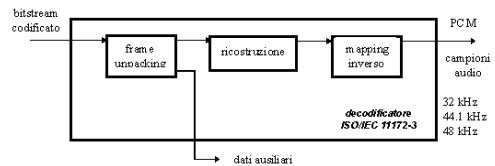


## Codificatore audio



Schema del codificatore audio di MPEG

## Decodificatore audio



Schema del decodificatore audio di MPEG.

## Preparing video for delivery

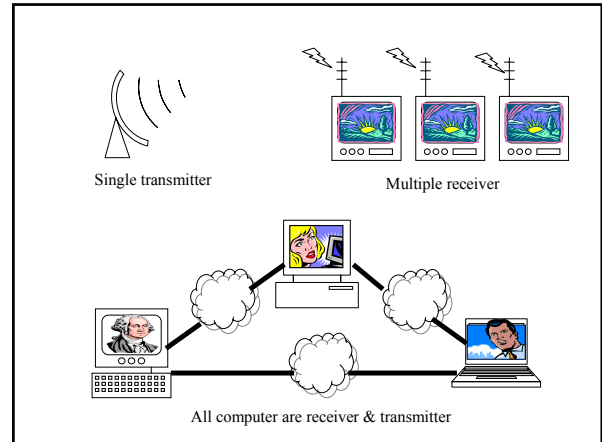
- The need to cope with limitations of the final delivery medium and playback platforms
- Compromises must be made at this stage, choosing what is to be sacrificed.
- The possibilities include: frame size, frame rate, colour depth, and image quality
- To ensure it is fit to play on any platform

## Streamed Video & Video Conference

- *Streamed video*
  - Delivering video data stream from a remote server, to be displayed as it arrives
  - As against downloading an entire files to disk & playing it from there
  - Opens up the possibility of delivering live video on computers

## Streamed Video & Video Conference

- *Video conference*
  - Streamed video doesn't restricted to a single transmitter broadcasting to many consumers: Any suitably equipped computer can act both as receiver & transmitter
  - Users on several machines can communicate visually, taking part in what is usually called a *video conference*



## Obstacle to Streamed Video

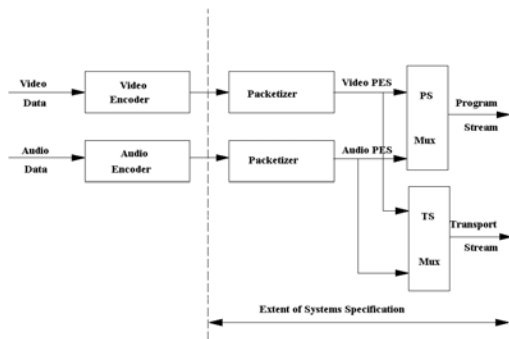
- Bandwidth
  - SIF MPEG-1 video require a bandwidth of 1.86 Mb/sec
  - Decent quality streamed video is restricted to LAN, T1 lines, ADSL & cable modems for now
- Delivering time over network
  - Deliver data with the minimum of delay
    - Delay may cause independently delivered video & audio stream to lose synchronization

## Systems

Parte dello standard che si occupa del trasporto e multiplexing dei dati.

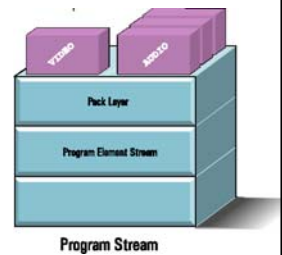
- Si distingue:
  - Program Stream (media);
  - Transport Stream (network);
- Si evita così di dipendere dalle tecnologie di rete;
- Packet Video;
- “Collage” tra MPEG Video ed MPEG Audio.

## Systems

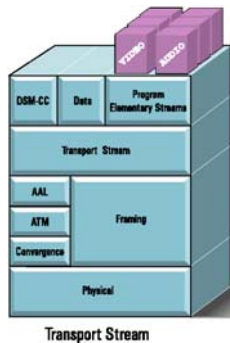


## Program Stream

- strutture dati lunghe;
- low-error environments;
- sincronizzazione A/V;
- private Data.



## Transport Stream



- Strutture dati corte e a lunghezza fissa (pacchetti da 188 byte);
- Multiplexing / Demultiplexing;
- Sincronizzazione A/V;
- Private Data;
- No error recovery;
- Channel guide;
- Informazioni di temporizzazione nei pacchetti;
- Sincronizzazione;
- Jitter correction;
- Supporto alla Crittografia (PPV).

## Transport Streams

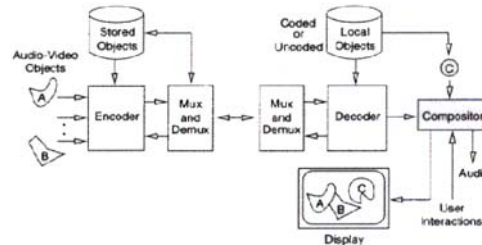
- Esistono due tipi di *Transport Streams*
  - SPTS Single Program Transport Stream
    - contiene diversi PES che condividono tutti una base dei tempi comune;
    - può contenere più istanze di Audio, Video, Dati, ma tutti con la stessa Time-Base.
  - MPTS Multiple Program Transport Stream
    - Multiplexing di diversi SPTS (bouquet)

## Informazioni di sincronizzazione

- Transport Stream
  - i pacchetti TS contengono informazioni di clock nei seguenti field:
    - Program Reference Clock (PCR) 42 bits;
    - Decoding Time Stamp (DTS);
    - Presentation Time Stamp (PTS).
  - È importante che durante la trasmissione venga mantenuta la sincronizzazione e il frame-rate tra trasmittente e ricevente;
  - Il PCR viene usato per sincronizzare i clock (27Mhz) di Tx ed Rx.

## Altri standard

MPEG-4 codifica a livello di oggetti, es.: figura vs. sfondo



## MPEG-4

Requisiti:

- Interattività;
- Migliore compressione;
- 3D scenes;
- Non-rectangular elements;
- Robustezza;
- Scalabilità;
- Editing;
- Random-Access;
- Hybrid, Natural and Synthetic Data coding.



## Objective of MPEG-4

- High compression
- Support for service profiles designed for classes of applications
- A wide range of channel bandwidths from a few Kbits/sec to many Mbits/sec
- Object-based access and manipulation
- Scalability of A/V objects for different channels and terminal resources

## MPEG-4

- Objective
  - Standardize algorithms for audiovisual coding in multimedia applications allowing for
    - Interactivity
    - High compression
    - Scalability of audio and video content
    - Support for natural and synthetic audio and video
- The Idea
  - An audiovisual scene is a coded representation of audiovisual *objects* related in space and time

## MPEG-4: Scenario

- A/V object
  - A video object within a scene
  - The background
  - An instrument or voice
  - Coded independently
- A/V scene
  - Mixture of natural or synthetic objects
  - Individual bitstreams multiplexed and transmitted
  - One or more channels
  - Each channel may have its own quality of service

## MPEG-4: Video Object Plane

- Video frame = sum of segmented regions with arbitrary shape (VOP)
- Shape motion and texture information of VOPs belonging to the same video object is encoded into a video object layer (VOL)
- Encode
  - VOL identifiers
  - Composition information
- Overlapping configuration of VOPs

## MPEG-4: Coding

- Shape coding
  - Shape information in alpha planes
  - Transparency of shape encoded
  - Inter and intra shape coding functions
  - After shape coding each VOP in a VO is partitioned into non-overlapping macroblocks
- Motion coding
  - Shift parameter and reference window
  - Standard macroblock
  - Contour macroblock

## Altri standard

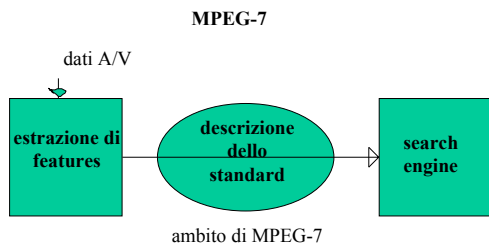
### MPEG 7

- Multimedia content description interface:
  - descrizione standard di material multimediale: immagini, testo, grafica, modelli 3D, audio, parlato, etc...
  - espressioni facciali, caratteristiche personali;
- consente ricerca e reperimento:
  - ricerca testuale e per contenuto;
- compatibile con standard per disegni e documenti, es. PDF.

## Objective of MPEG-7

- A flexible, extensible, multi-level, and standard framework for describing multimedia
- Standardize content-based description for various types of audiovisual information.
  - Enable fast and efficient content searching, filtering and identification
  - Describe several aspects of the content (low-level features, structure, semantic, models, collections, creation, etc.)
  - Address a large range of applications

## Altri standard



- Precision
- Recall

## Altri standard

### MPEG-7 - applicazioni:

- digital library - video, grafica, musicale, ....
- multimedia directory service
- broadcast media selection, canali radi e TV
- multimedia editing, media authoring

## Types of Description

- Information about the content
  - Recording data & conditions, title, author, copyright, coding format, classification, etc.
- Information present in the content
  - Combination of low level and high level descriptors  
Descriptor, Description Scheme, Description Definition Language

## MPEG-7 : Multimedia Content Description Interface

### Manipulation :

Content Analysis/Feature Extraction

### Search :

Content-Based Information Retrieval

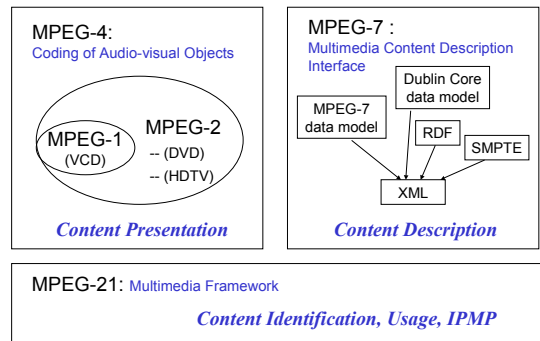
### Interaction :

Descriptor (D), Description Scheme (DS)  
Description definition Language (DDL)

### Management :

Description-related Metadata

## MPEG



## **Siti Web**

**MPEG home page**  
**[www.cse1t.it/mpeg/](http://www.cse1t.it/mpeg/)**

**MPEG pointers e risorse**  
**[www.mpeg.org](http://www.mpeg.org)**