MPEGIF Master Class

- An Expert Glimpse of TV in 2011 and Beyond

Standards & Compressions for 3DTV transmissions

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Agenda

- 3DTV
- Standardization
- Encoding
- HDMI 1.4a - what's missing?

Telenor Satellite Broadcasting

- Part of Telenor Broadcast, which again is part of the Telenor Group, one of the world's largest mobile operator (in terms of subscriptions).
- Prime orbital location at 1°West
  - Nordic market leader
  - Emerging hotspot for CEE
  - Already established satellite position:
    - 2.1 million satellite households in the Nordic region*
    - 2.5 million DTH households in CEE *
  - Increased cable head end reach position:
    - 5.8 million cable Nordic
    - 6.3 million cable CEE
- Delivering Head-end services for
  - DTH (270 services)
  - IPTV (430 services)
  - DTT (50 services)
- First 3DTV test transmission in May 2010

Stereoscopic images - also called 3D….

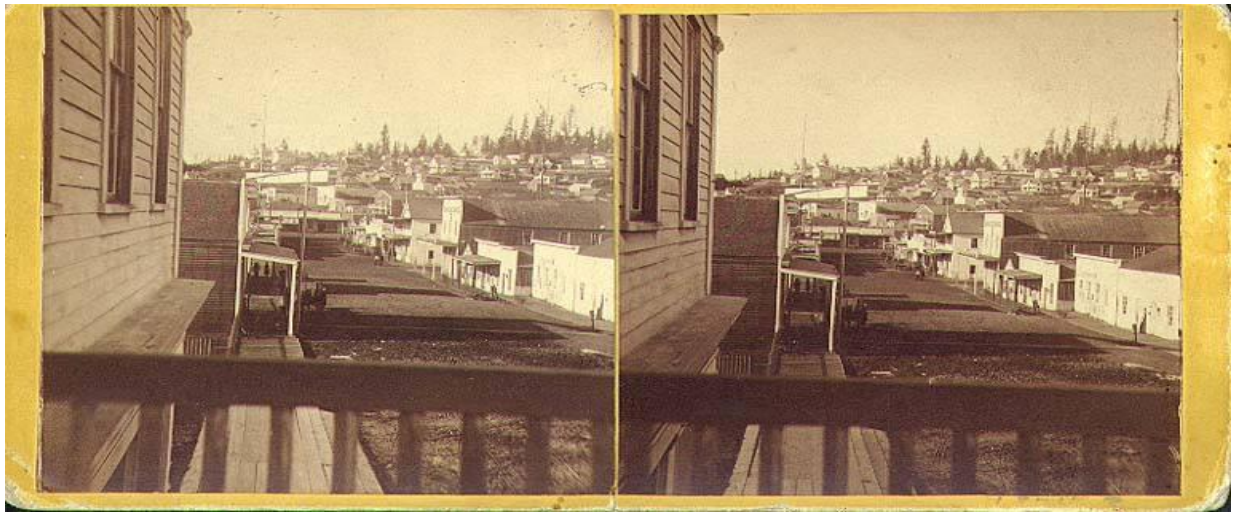
- Illusion of depth in a 2D-image
- The viewer needs two eyes
- Need a filter, typically glasses
- Apr. 10 % cannot see stereoscopic TV

The development of TV
- a history of backwards compability

- Black-and-white television
- Color TV (owners of old TV’s could still watch)
- Digital TV (owners of old TV’s could still watch)
- HDTV (owners of old TV’s could still watch)
- 3DTV (owners of old TV’s could NOT watch)

3D images is not new!

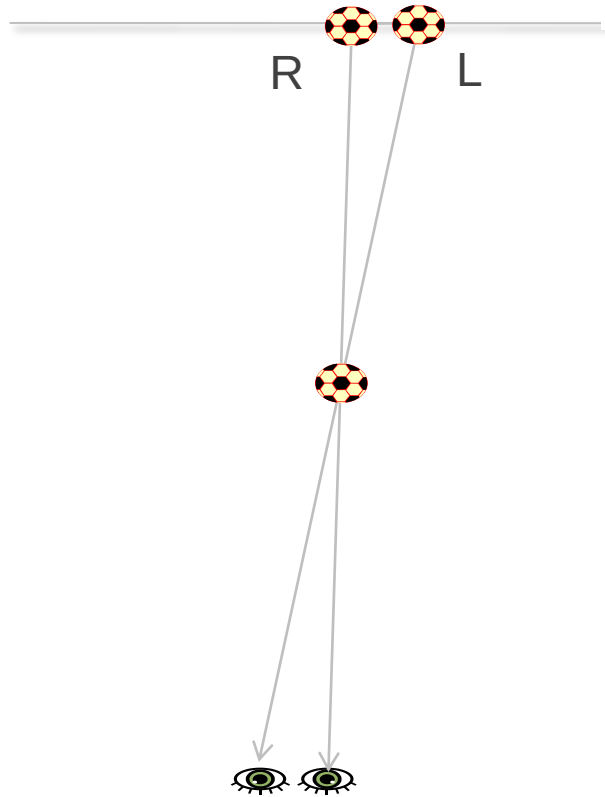
Invented by Sir Charles Wheatstone in 1840



1st Ave., Seattle, 1874

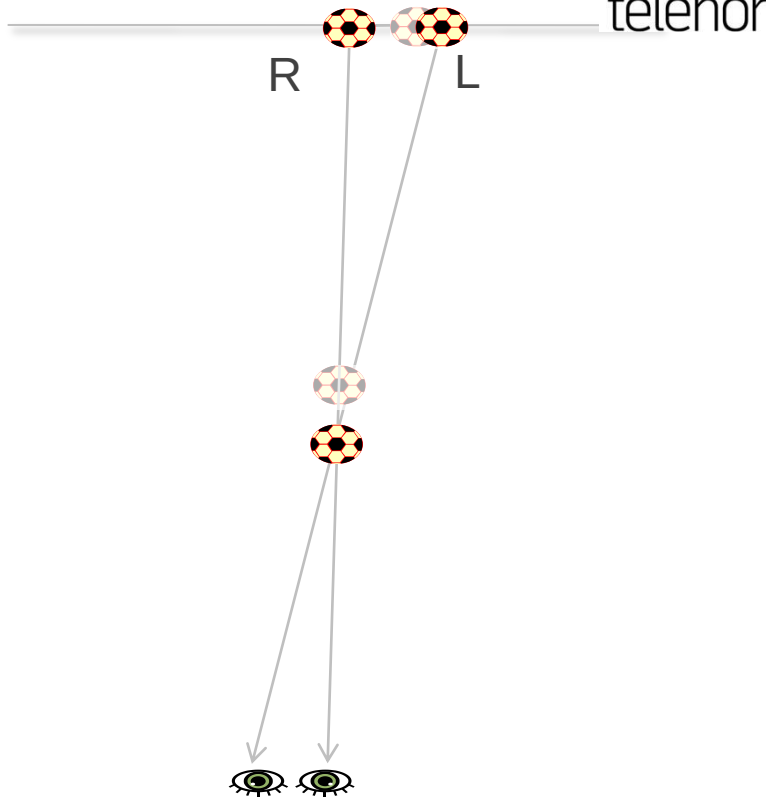
Visualisation of the 3rd dimension

- Objects may be visualized
  - in front of ….
  - …or behind the TV screen



Visualisation of the 3rd dimension

- Objects may be visualized
  - in front of ….
  - …or behind the TV screen
- A tiny displacement will change the distance to the object
- The size of the geometry is linked to the distance between our eyes, ……which corresponds to 150 pixels
- Horizontal resolution is key to get a good 3D



3D television – standardizing

- DVB (Digital Video Broadcast, standardizing body for digital TV) are working with standardizing 3D for television
- Two working groups:
  - DVB-CM-3DTV (Chair: David Wood, EBU)
  - DVB-TM-3DTV (Chair: David Daniels, BSkyB)
- Phase 1: Frame compatible mode
- Phase 2: Service compatible mode

Phase 1 – Frame compatible mode

- Compiling right and left images in one HDTV-frame (1920 x 1080i or 1280 x 720p)
- Reduces the picture resolution to
  - 960 x 1080 (Side-by-Side)
  - 1920 x 540 (Top-and-Bottom)
  - 1280 x 360 (Top-and-Bottom)

Phase 1 – Frame compatible mode

- The Service can only be used for 3DTV
  - No backwards compability
- A Service can, with adjustments to graphics and subtitling, be transmitted to legacy HDTV settop boxes
- A lot of broadcasters are already transmitting or planning to transmit in the Side-by-Side format
- Great for big networks that can dedicate a full-time service to 3DTV
  - For smaller networks and individual broadcasters, a full-time 3DTV service is a long way off
- The viewer does not need a new settop box, but she needs a new TV!
- Not HDTV quality
  - Either half horizontal resolution or half vertical resolution
  - Unbalanced H and V resolution
- Decoders must be upgraded
  - Are we sure all decoders can handle the extra load?

Phase 2 – Service compatible mode

- Transmitted as 2D, but with ancillary information for conversion to 3DTV
- Gives the full HDTV 1920 x 1080 or 1280 x 720 resolution to both eyes
- Same principle chosen for
  3DTV Blu-ray Disc

Phase 2 – Service compatible mode

- Same quality as HDTV
  - Full HDTV resolution to each eye
  - Symmetrical H and V resolution
  - In Europe, we have spent five years educating the viewers to HDTV
- Can be backwards compatible with “normal” HDTV
- Old settop boxer ignore the ancillary information
- The viewer can choose between ”2D” and ”3D”
  - The n +1 viewer scenario…..
- Gives the option to have 3DTV events in a HDTV service
- For smaller networks and individual broadcasters, this probably the only path to 3DTV

Encoding of 3DTV

- Frame compatible mode
  - Can use a normal H.264 HDTV encoder
  - More bitrate is needed
- Service compatible mode
  - Several formats, some are available today, some are not
    - H.264 Simulcast
    - H.264 MVC Stereo High profile (like 3D Blu-ray)
      Prototype shown here at IBC
    - H.264 MVC Multiview High profile
    - 2D + something (delta + depth maps + occlusion maps + …)
    - High Efficiency Video Coding (HVC)

HDMI 1.4a

- HDMI 1.4a defines formats between a 3DTV source and the screen
- If a HDMI source can transmit 3D video, then it have to be able to transmit at least one of the following

Frame packing:

- 1920 x 1080p @ 23.98 / 24Hz
- 1280 x 720p @ 59.94 / 60Hz
- 1280 x 720p @ 50Hz

Side-by-Side (Half):

- 1920 x 1080i @ 59.94 / 60Hz
- 1920 x 1080i @ 50 Hz

Top-and-Bottom:

- 1920 x 1080p @ 23.98 / 24Hz
- 1280 x 720p @ 59.94 / 60Hz
- 1280 x 720p @ 50Hz

Source: High-Definition Multimedia Interface Specification Version 1.4a Extraction of 3D Signaling Portion

HDMI 1.4a - What's missing?

- Backwards compatible with HDTV requires 1080i @ 50 and 59,94 / 60 Hz
- Future would require 1080p @ 50 and 59,94 / 60 Hz

- So we need:

  Frame packing:
  - 1920 x 1080i @ 59.94 / 60Hz
  - 1920 x 1080i @ 50Hz
  - 1920 x 1080p @ 59.94 / 60Hz
  - 1920 x 1080p @ 50Hz
- These are Primary formats, but not Mandatory formats in HDMI 1.4a

Conclusion

- Telenor Broadcast are positive to 3DTV and wishes to transmit 3D to the Canal Digital customers as soon as possible
  - We see this as a natural development of the TV offering
- Telenor Broadcast do not believe in a solution that gives a lower resolution for 3DTV than HDTV
  - Service compatible mode
- Telenor Broadcast supports the standardizing work in DVB
- The marked is not mature
- It is not known what technical solution DVB will chose

Questions?

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Canal Digital

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