

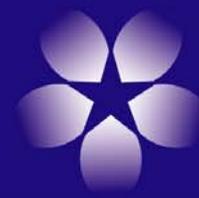
Multichannel audio: From studio to listener

EBU NMC Seminar June
2004.

Erik Lundbeck



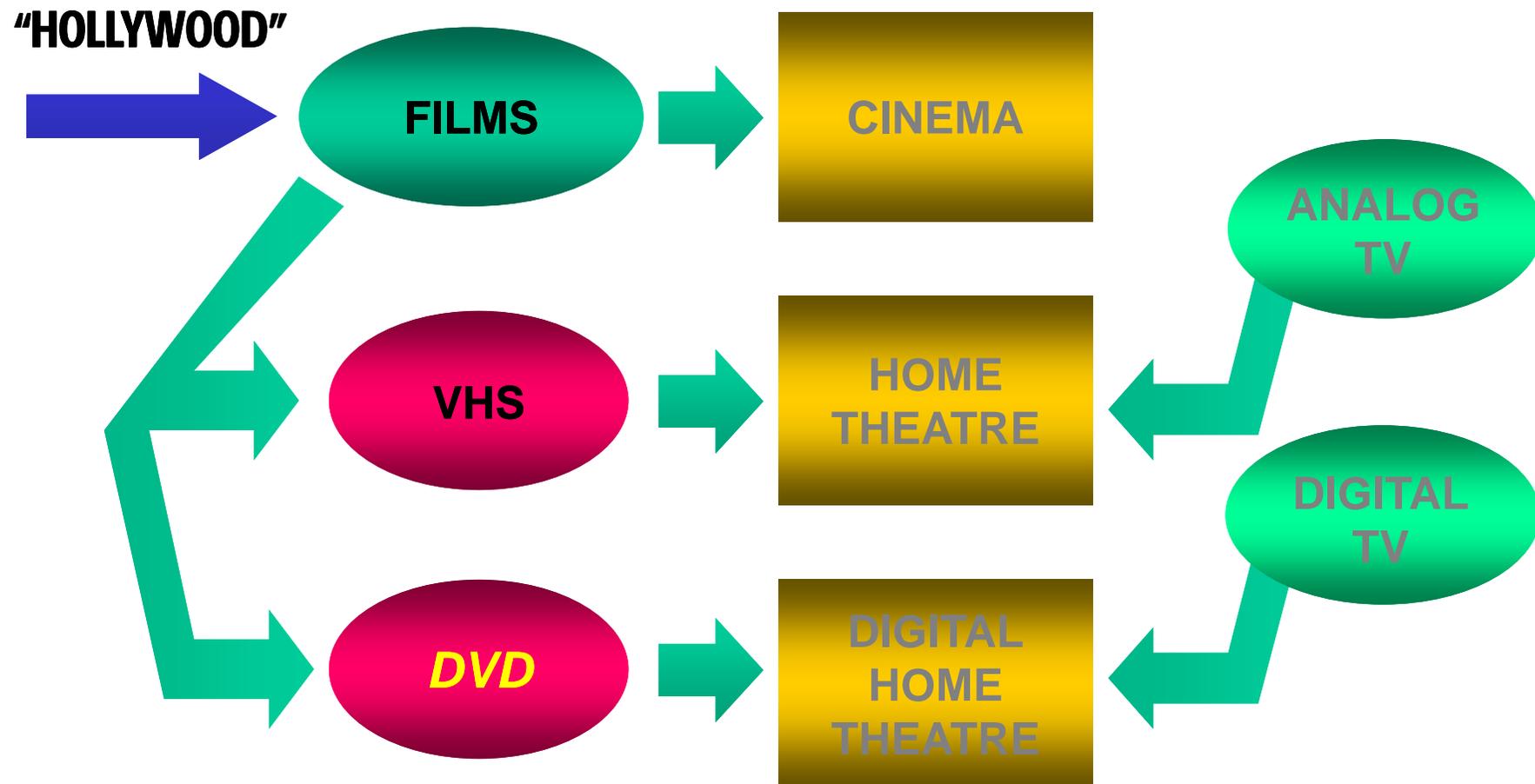
Erik Lundbeck
Senior Engineer
Corporate Development
Technology
Swedish Television

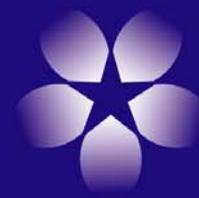


How multichannel audio came home....

EBU NMC Seminar June 2004.

Erik Lundbeck





DVB is not only wide screen.....



DVB-T,S,C

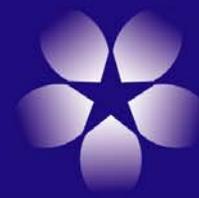


16:9-TV

It's also:



**5.1 digital audio
in Home Theatre**

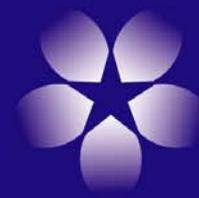


Why introduce a new audio system ?

EBU NMC Seminar June
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Erik Lundbeck

1. Give digital radio and television extra value
2. Make the digital broadcast more attractive to the public by introducing a service that is in demand.

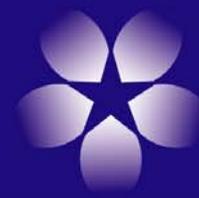


Why 5.1 audio ?

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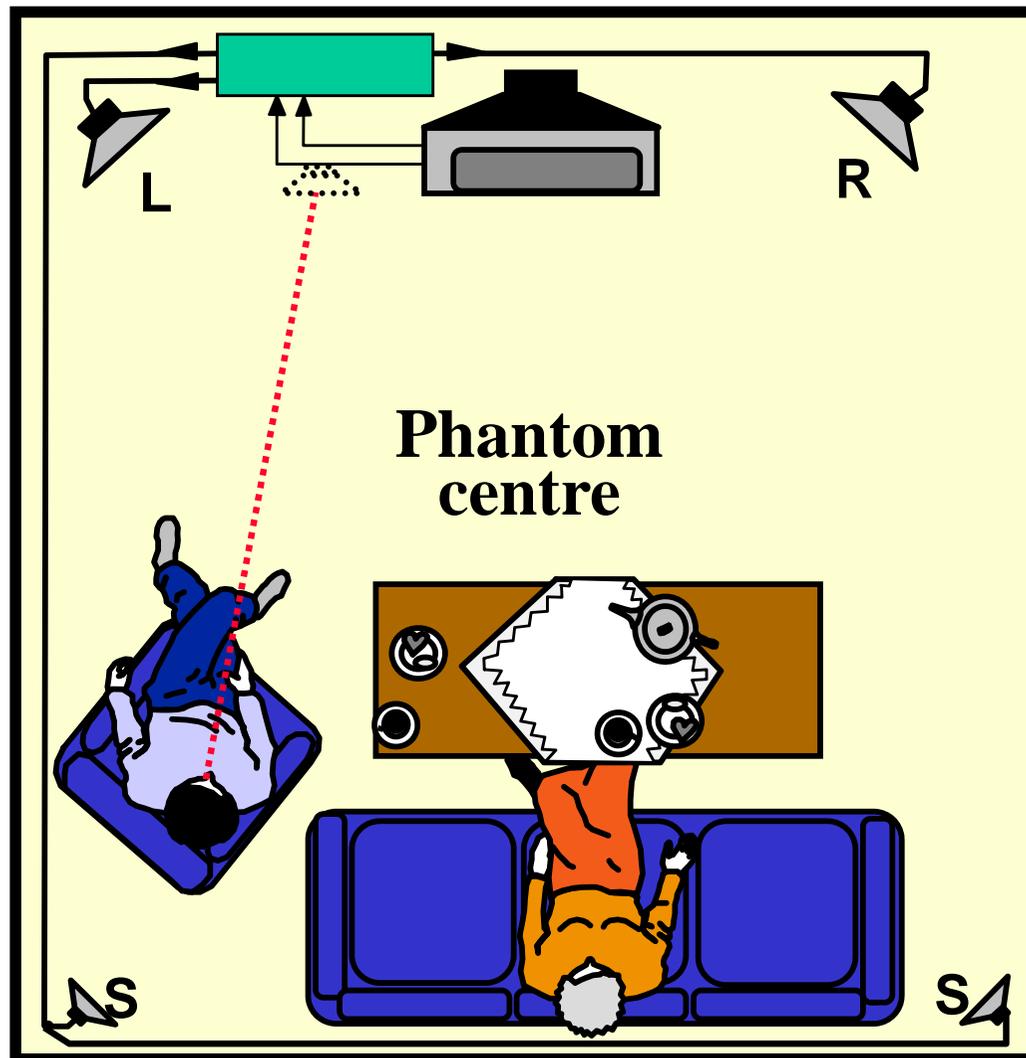
1. The Centre channel



Why 5.1 audio ?

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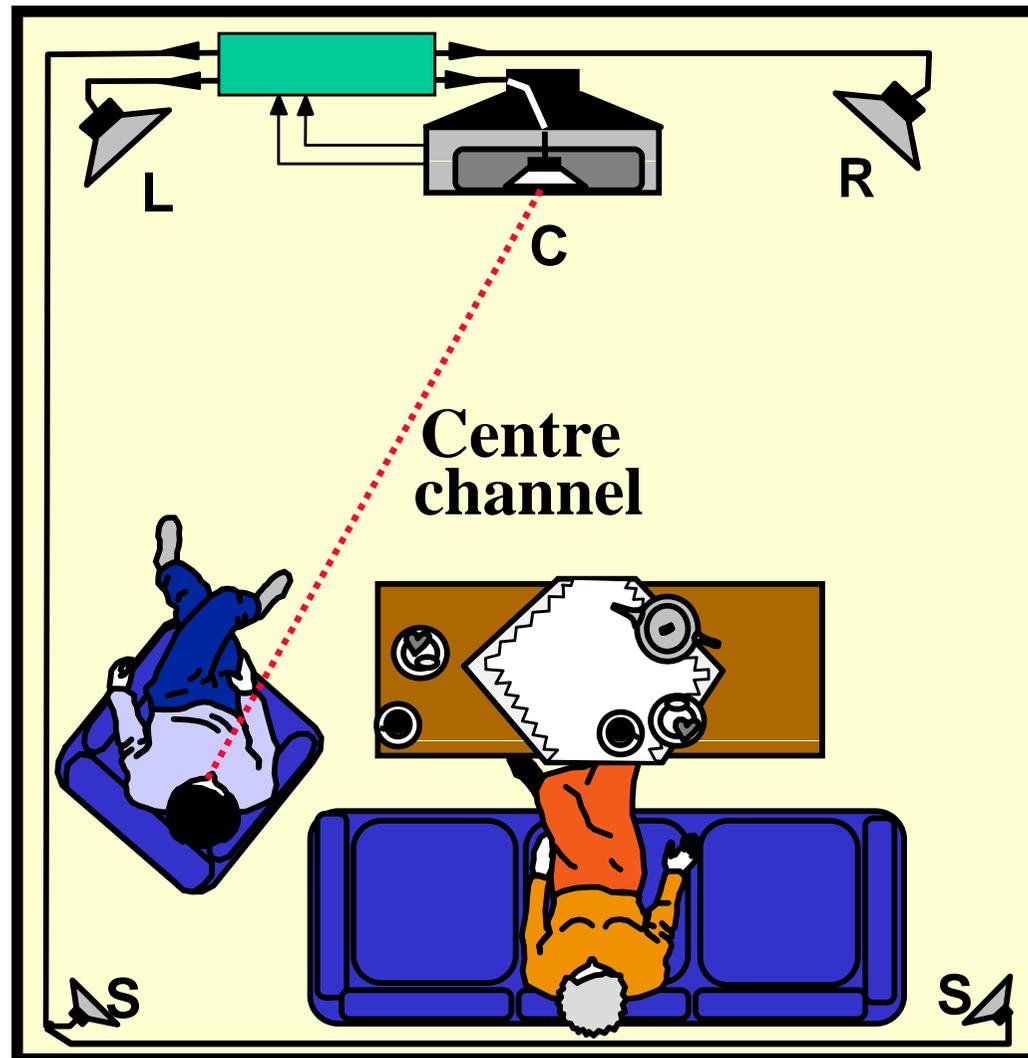




Why 5.1 audio ?

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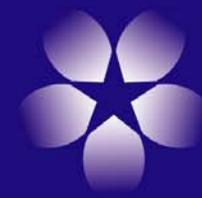
Erik Lundbeck





Why 5.1 audio ?

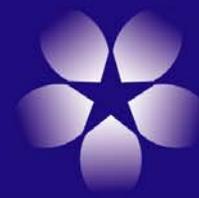
1. The Centre channel
2. Greater sound experience
3. Possibility for META DATA,
such as "Dialogue level" and "DRC"



Infrastructure

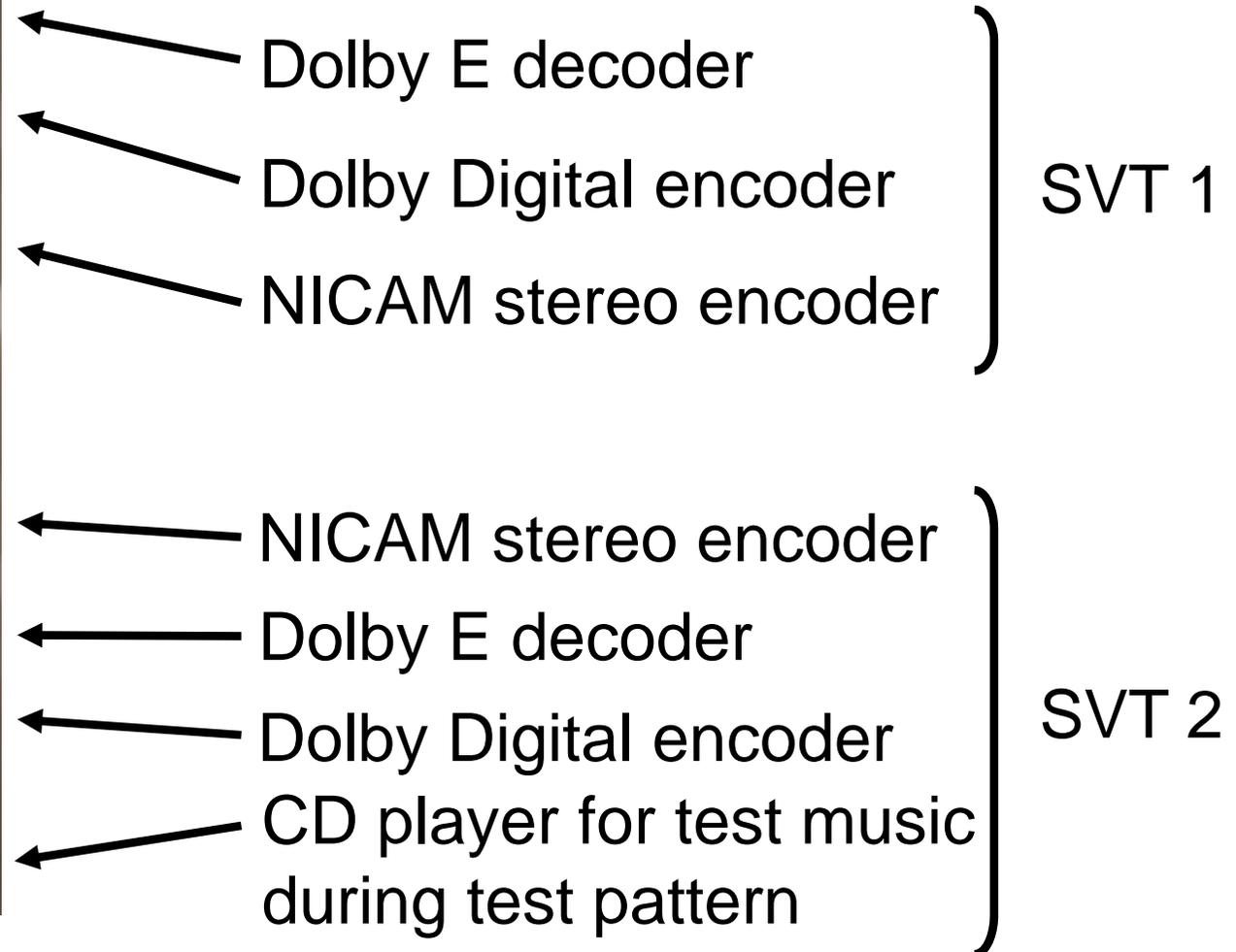
1. SDI with embedded audio for TV
 - a) Stereo sound in first AES/EBU pair, Group 1
 - b) 5.1 audio encoded as DTS/Dolby E signal in second AES/EBU pair, Group 1
2. AES/EBU for radio, encoded as DTS or Dolby E
3. Normal bitrate for TV broadcast

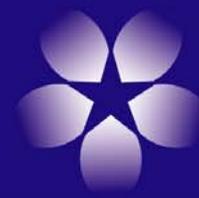
5.1 audio	384 kbit/s (448 kbit/s)
Stereo	192 kbit/s (256 kbit/s)



Infrastructure

Example of an 5.1 audio installation in a TV broadcast environment.





What has happened so far ?

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SKY movies

YLE

Sveriges Radio



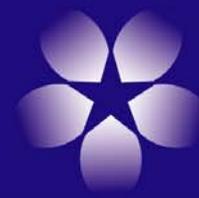
SQT 1

TELECLUB
DIGITAL TV ENTERTAINMENT



Bayerischer Rundfunk



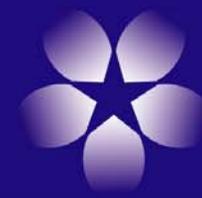


The MCA work within the EBU.

1. EBU B/MCAT (MultiChannel Audio Transmission)

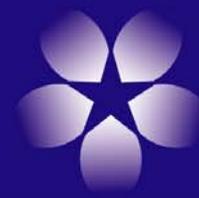
EBU broadcasters are actively supporting multichannel audio for both radio and television.

2. EBU P/AGA (Advisory Group on Audio)



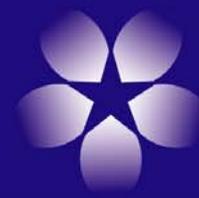
The MCA work within the EBU.

1. Make the EBU Eurovision network capable for MCA broadcast. (Among others B/MCAT)
2. Market implementation matters (B/MCAT)
3. Updating EBU Recommendations (P/AGA)
4. Specification for a MC version of the BWF (P/AGA)



Production

1. Today nothing is right or wrong in MCA production.
2. Do not forget the centre channel.
Essential in TV production
3. In TV production you have the picture to consider. In Radio you do not

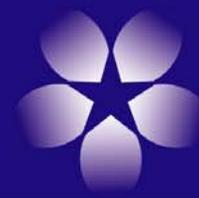


Production

Listen to 5.1 radio examples from
Swedish Radio

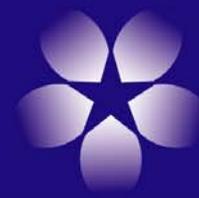
www.sr.se/multikanal/english/e_index.stm





Production

1. More difficult going from mono to stereo than from stereo to 5.1.
2. Digital TV production means problems with A/V sync.
No difference in 5.1 production.



Production

DELAYS:

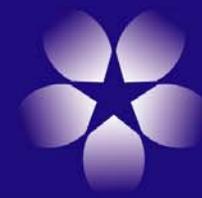
1. CCD Camera	1/2 frame
2. Videomixer with DVE	1 frame
3. Dolby E encoding	1 frame
4. Dolby E decoding	1 frame
5. Flat screen displays	2 frames
6. STUs, receivers	different delays



Production

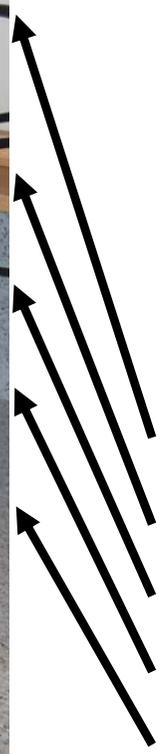
Downmix to stereo:

1. Static downmix from 5.1 mix via a separate mixer
2. Downmix from 5.1 mix via Dolby ProLogic 2 encoder
3. Totally separate stereomix



Production

Stereo down mix using a Seeport mixer



- Axon SDI embedder
- Dolby E decoder
- Dolby E encoder
- Dolby Prologic 2 encoder
- Dolby Multichannel Audio Tool

**CODING
TROLLEY**

First 5.1 audio live broadcast at SVT

EBU NMC Seminar June 2004.

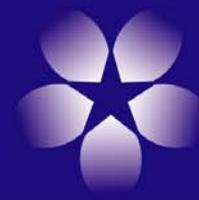
Erik Lundbeck

25th of June
2003

A sing-along program

”Allsång på Skansen”





First 5.1 audio live broadcast at SVT

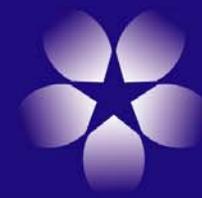
EBU NMC Seminar June 2004.

Erik Lundbeck



The remote control for the Dolby Multichannel Audio Tool used for monitor listening





Thank You for listening

Erik Lundbeck

e-mail: erik.lundbeck@svt.se