

QoE and COMPRESSION ARTEFACTS

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OUTLINE

❖ Introduction

- ❖ Broadcasting
- ❖ Content
- ❖ Value Chain
- ❖ Content (Media) Delivery Platforms
- ❖ What is OTT? (Over the Top)
- ❖ IPTV

❖ QoE

- ❖ Compression Artefacts
- ❖ Evaluation challenges
- ❖ Summary

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BROADCASTING

❖ RR 1.38 broadcasting service: A radiocommunication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmission.

❖ Radio Regulations (RR) of ITU



CONTENT

- ❖ Radio
- ❖ Television
- ❖ Social media
- ❖ Text
- ❖ Voice
- ❖ Sound
- ❖ Video
- ❖ Film
- ❖
- ❖ Evolving Media

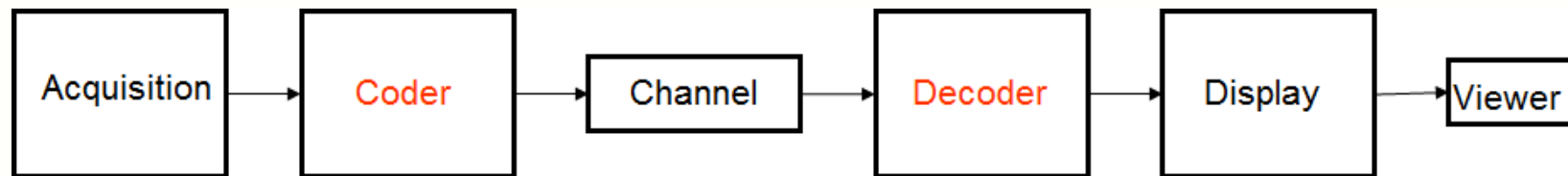
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VALUE CHAIN



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CONTENT (MEDIA) DELIVERY PLATFORMS

- ❖ Terrestrial
- ❖ Satellite
- ❖ Cable
- ❖ IP/Broadband



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WHAT IS OTT?

- ❖ Over the Top are the audio-visual services delivered over broadband and internet
- ❖ OTT are over unmanaged networks from the television services operators point of view
- ❖ As there is a return channel, full interaction is possible.



WHAT IS OVER THE TOP?

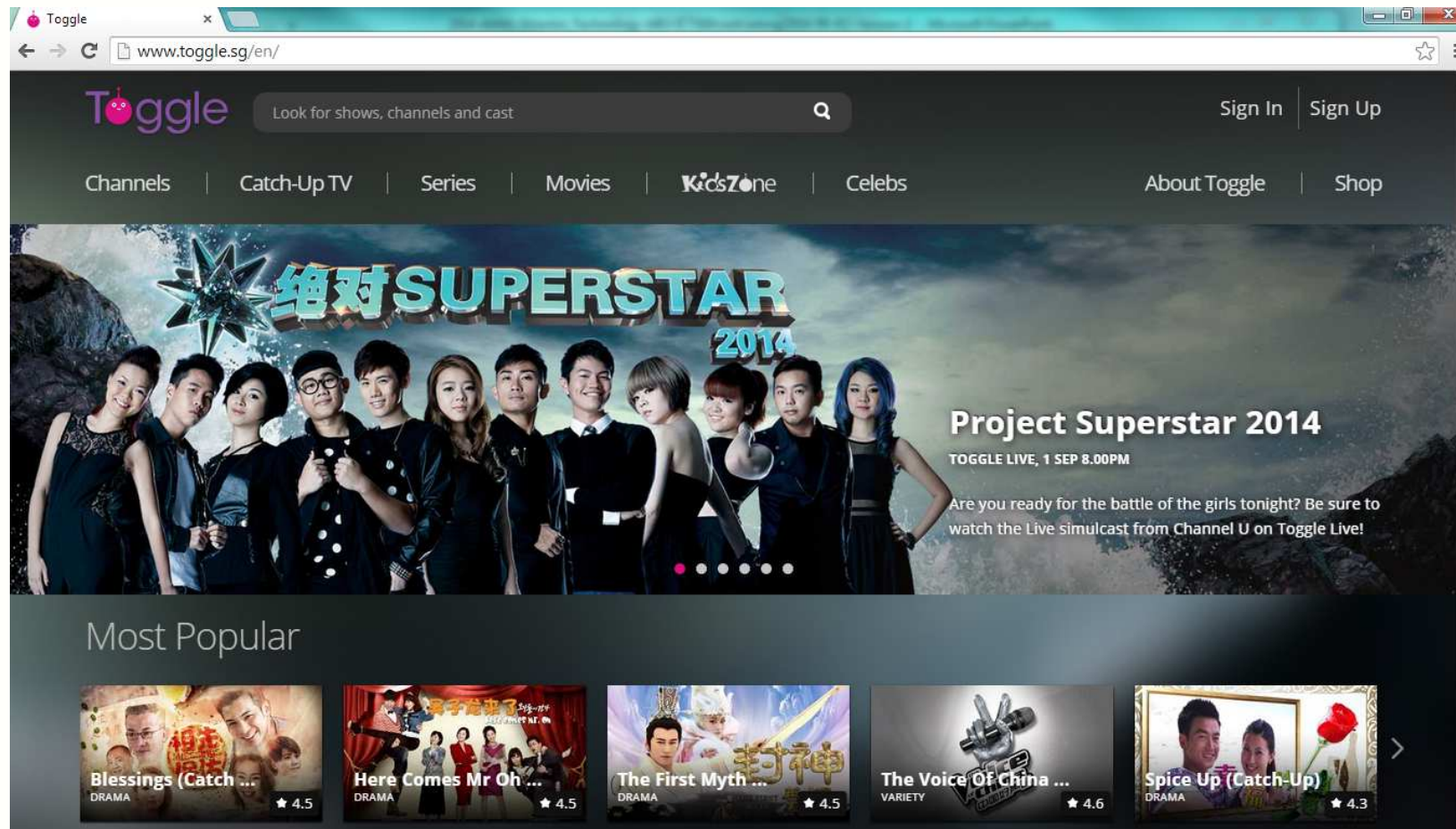
- ❖ OTT is delivered directly from provider to viewer using an open internet/broadband connection, independently of the viewer's ISP, without the need for carriage negotiations and without any infrastructure investment on the part of the provider
- ❖ It is a 'best effort', **unmanaged** method of content delivery via **the Internet** that suits providers who are primarily broadcasters rather than ISPs



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TOGGLE FROM MEDIACORP SINGAPORE



Toggle

Look for shows, channels and cast

Sign In Sign Up

Channels | Catch-Up TV | Series | Movies | KidsZone | Celebs | About Toggle | Shop

绝对 SUPERSTAR 2014

Project Superstar 2014

TOGGLE LIVE, 1 SEP 8.00PM

Are you ready for the battle of the girls tonight? Be sure to watch the Live simulcast from Channel U on Toggle Live!

Most Popular

- Blessings (Catch-Up) DRAMA ★ 4.5
- Here Comes Mr Oh ... DRAMA ★ 4.5
- The First Myth ... DRAMA ★ 4.5
- The Voice Of China ... VARIETY ★ 4.6
- Spice Up (Catch-Up) DRAMA ★ 4.3



بین المللی کنفرانس فناوری های رسانه ای

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IBB INTEGRATED BROADCAST BROADBAND

- ❖ With the availability of devices connected to broadband gives viewers option to access additional content
- ❖ Almost all the traditional broadcasters are currently offering their viewers to access some selected content as catch up or additional contents related to the lined up programmes via broadband networks
- ❖ There are number of systems that can operate in hybrid configuration
- ❖ The most of these systems have explored ICT- Information and Communication technologies to build such system

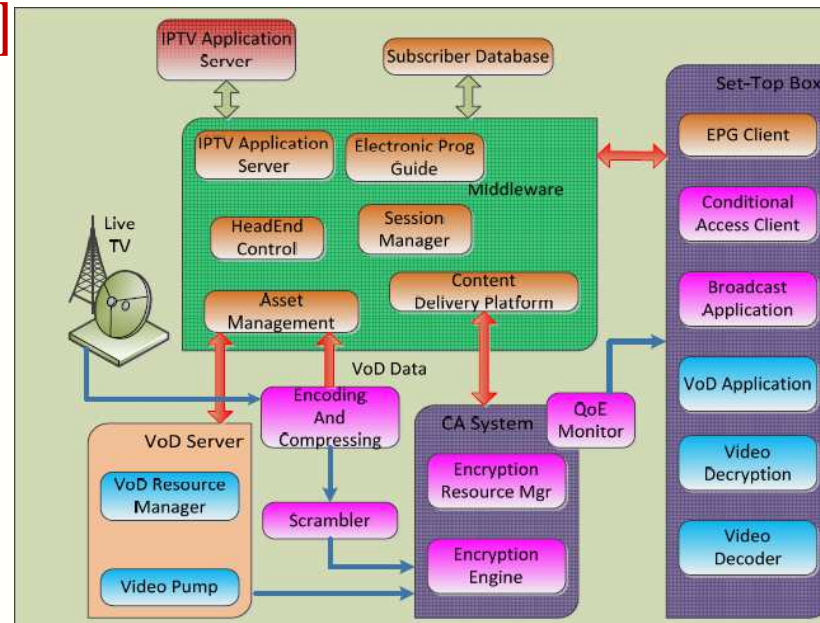


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IPTV

❖ Multimedia services such as television, video, audio, text, graphics, and other data delivered over IP based networks managed to provide the required level of Quality of Service/Quality of Experience (QoS/QoE), security, interactivity and reliability [ITU]



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QoE

Quality of Experience (QoE)

The overall acceptability of an application or service, as perceived subjectively by the end-user.

NOTES

- ❖ Quality of Experience includes the complete end-to-end system effects (client, terminal, network, services infrastructure, etc.).*
- ❖ Overall acceptability may be influenced by user expectations and context.*

[Source: ITU-T Study Group 12 (Geneva, 16-25 January 2007)]



ARTEFACTS

- ❖ Particular visible effects, which are a direct result of some technical limitation
 - ❖ Quantel Digital Fact Book, [Pank, 1988-2008]
- ❖ Some technical limitations are
 - ❖ Bandwidth & Storage
 - ❖ Display device
 - ❖ Camera
- ❖ Why digital compression?
 - ❖ Limited bandwidth
 - ❖ Limited Storage

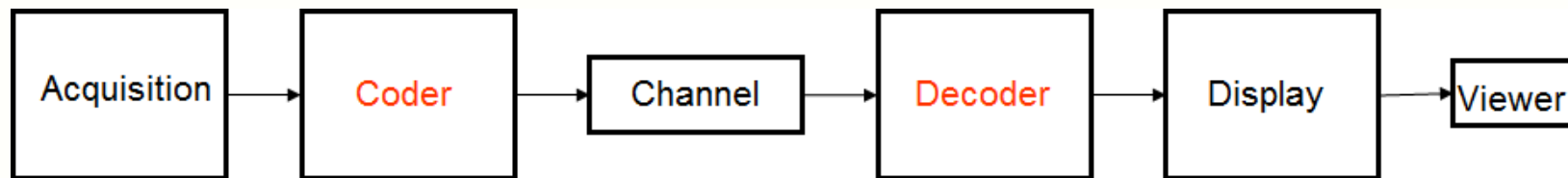
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A TAXONOMY OF ARTEFACTS

❖ Based on origin



❖ Based on domains

- ❖ spatial
- ❖ temporal

میزبان علمی فناوری رسانه
مؤتمر بین المللی مهندسی مخابرات

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BLOCKINESS

PSNR = 48dB



SNR = 27dB



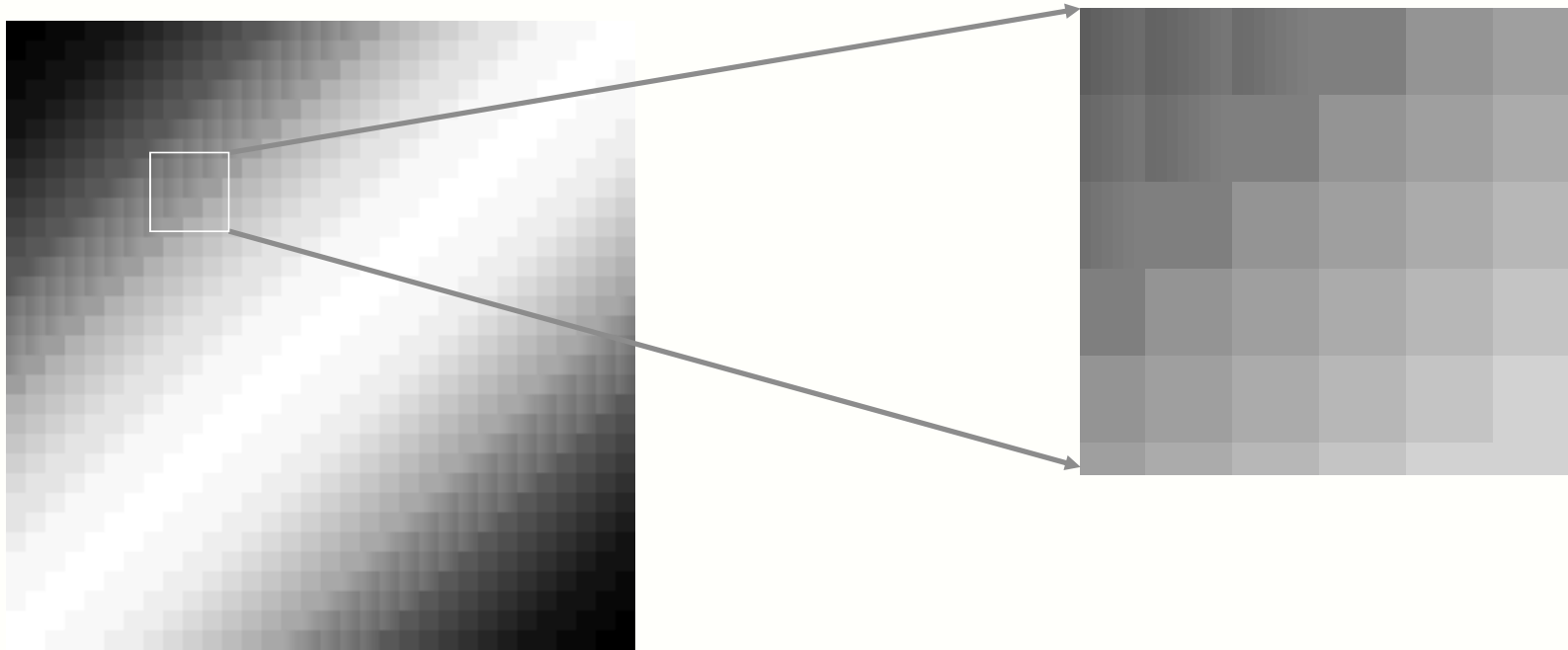
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A vertical decorative graphic on the right side of the slide. It features a glowing blue globe with binary code (0s and 1s) overlaid on it. Several satellite-like icons are connected to the globe by thin lines. Below the globe, there is Persian text in a stylized font. At the bottom, the conference details are listed in white text on a dark blue background.

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BLOCKINESS ARTEFACT

Reconstructed image



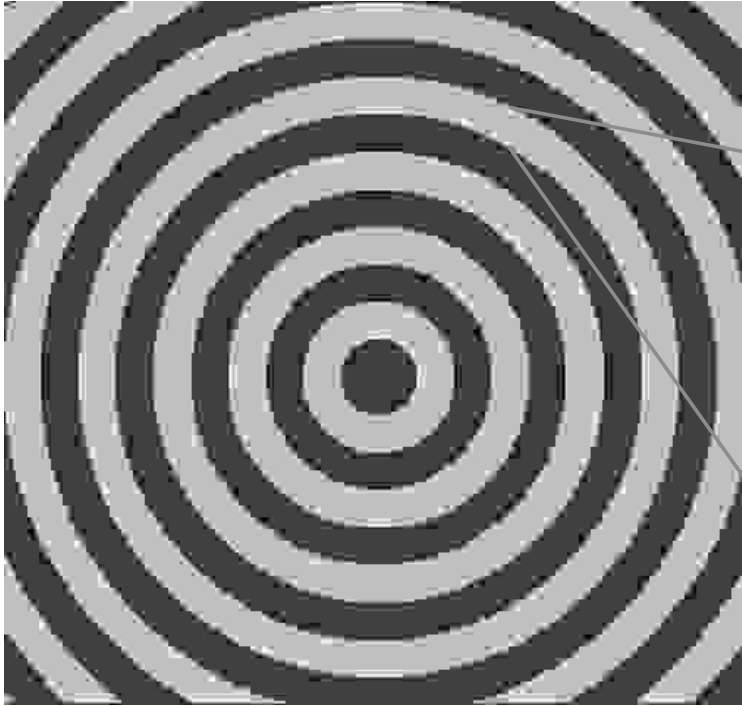
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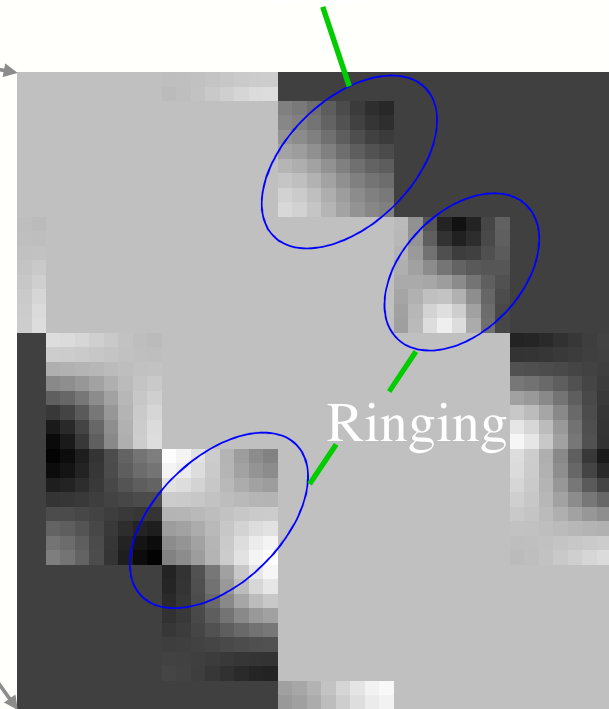
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RINGING



Reconstructed pattern



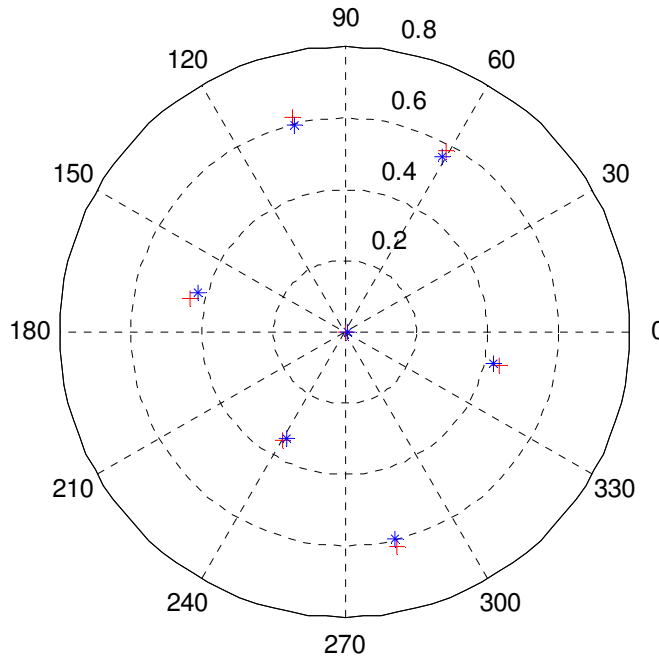
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COLOUR BLEEDING

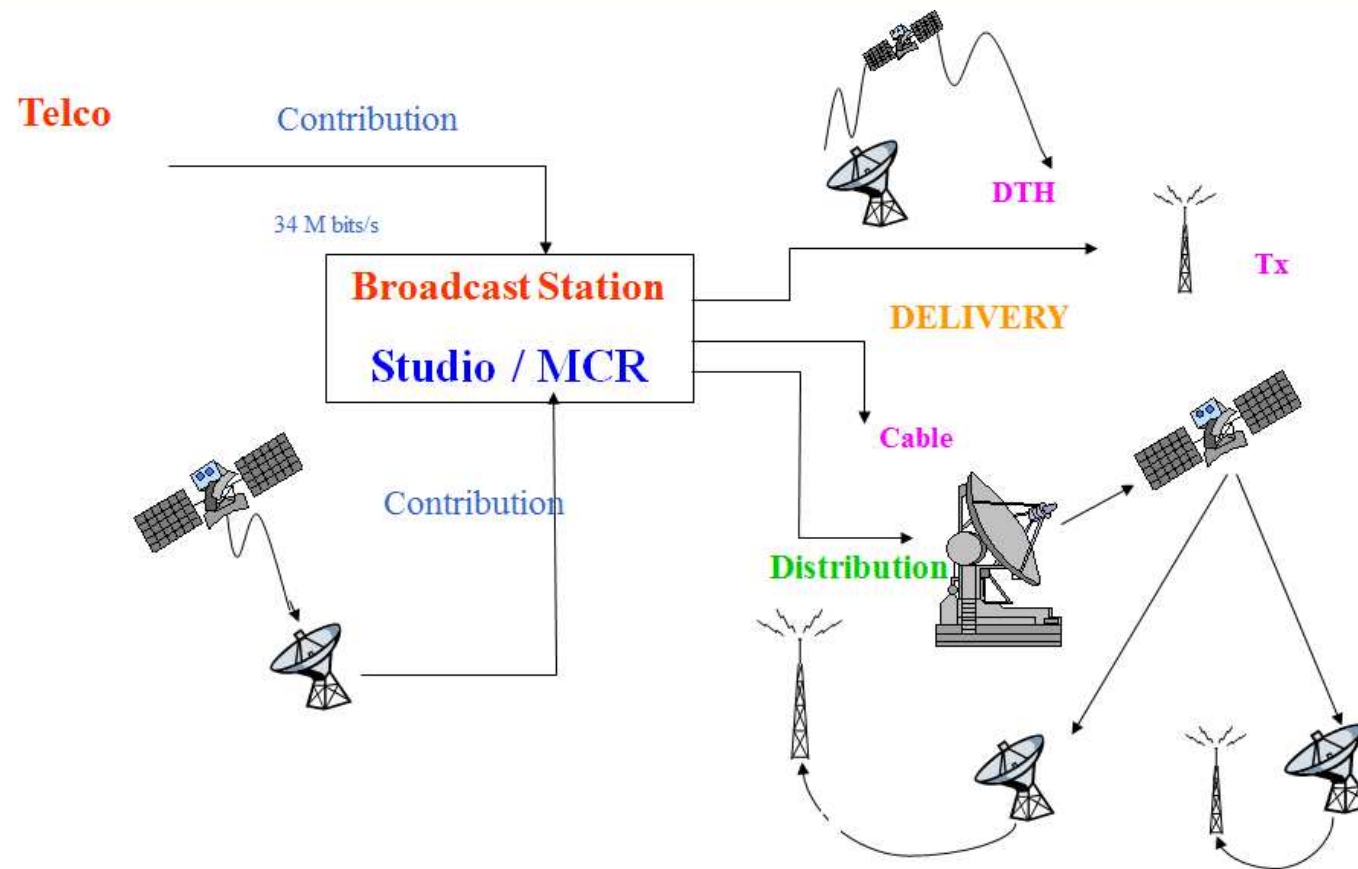
Compression Ratio=39,
Original image Red +, JPEG-Reconstructed Image Blue *



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TRADITIONAL MEDIA NETWORK (TV)



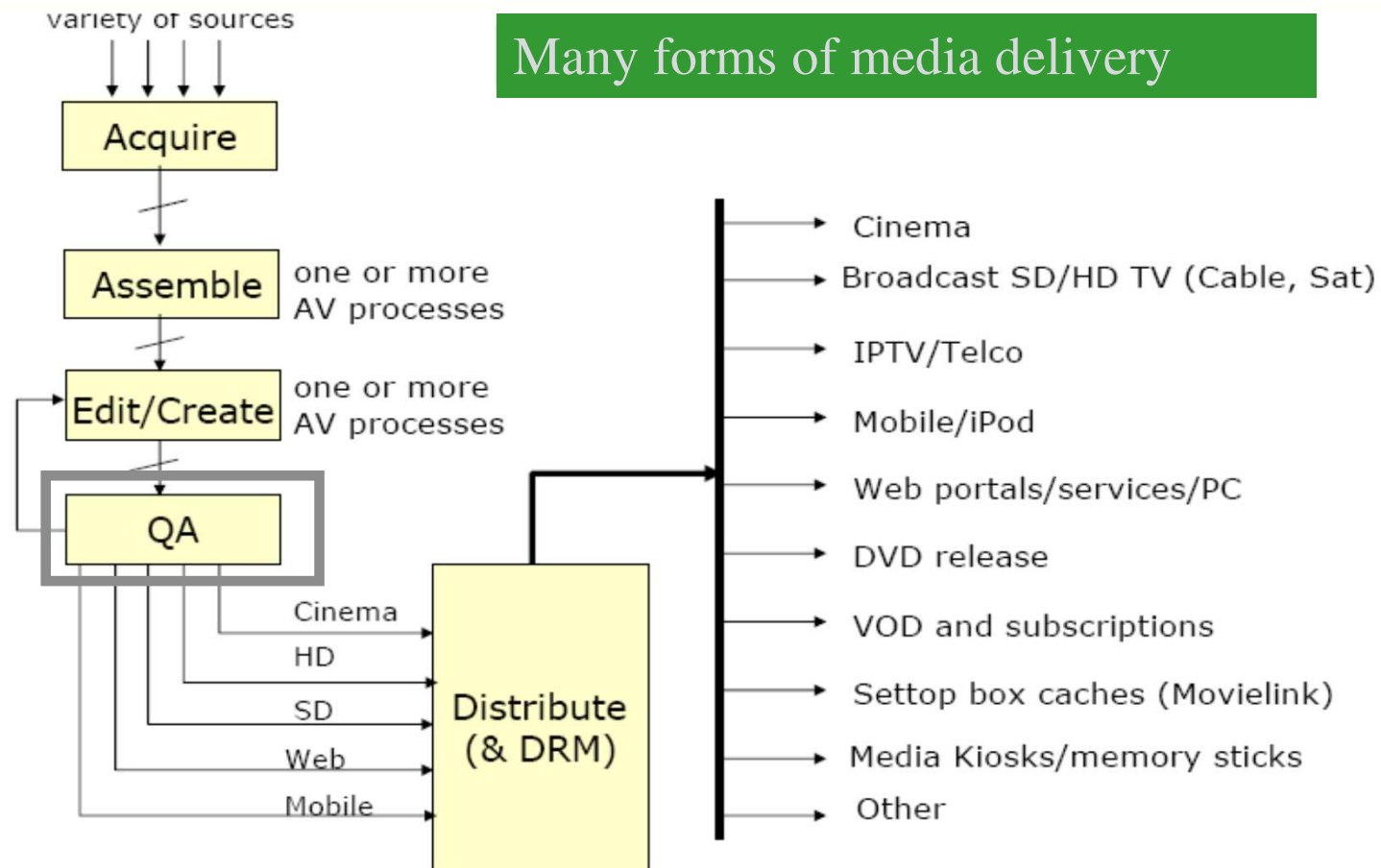
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MEDIA DELIVERY



Many forms of media delivery

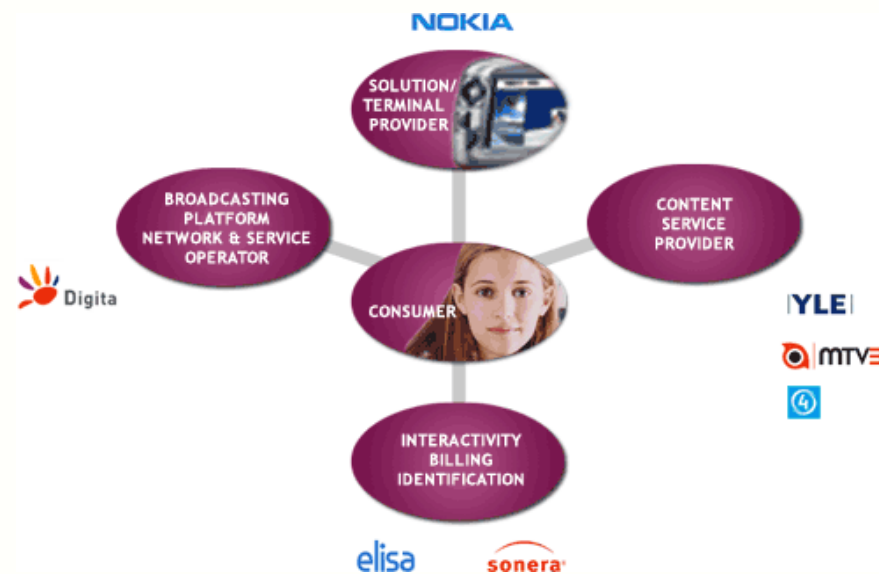


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CHANGING MEDIA LANDSCAPE

- ❖ Broadcasting evolve into Datacasting
- ❖ Convergence of services, networks and devices
- ❖ New delivery options
 - ❖ Media delivery to mobile devices
- ❖ QoS & QoE are major issues



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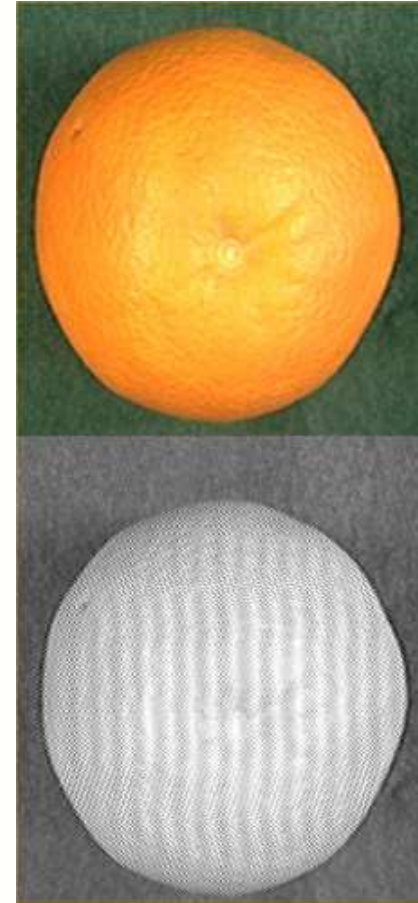
COLOUR TELEVISION

❖ Since 1965 three encoding methods

- ❖ NTSC
- ❖ PAL
- ❖ SECAM

❖ Artefacts

- ❖ large area flicker – due to low frame rate
- ❖ line crawling - due to line scan
- ❖ colour artefacts – due to encoding
 - ❖ Cross-luminance
 - ❖ Cross-chrominance



Chrominance-to-luminance crosstalk



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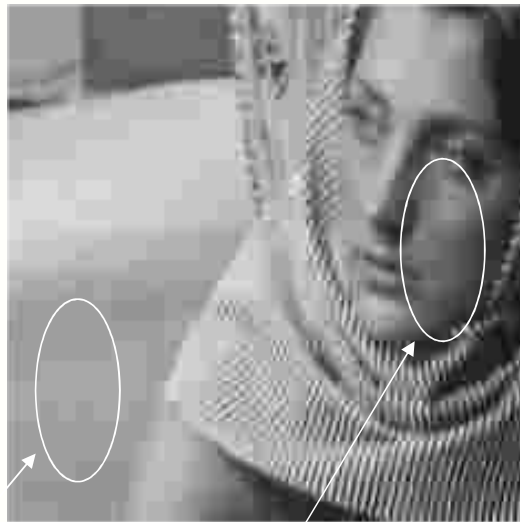
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CODING ARTEFACTS

❖ Image quality is influenced by – distortions due to codecs - artefacts



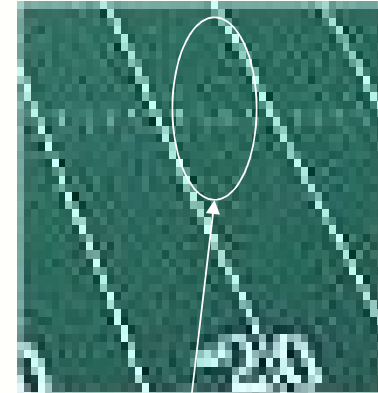
Contouring



Blockiness



Colour bleeding



Ringing

Source: Punchihewa, IVCNZ

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ITU RECOMMENDATIONS GOVERNING VIDEO QUALITY

Standard	Application
BT-500-11 2002	Methodology for the subjective assessment of the quality of television pictures
BT-802-1 1994	Test pictures and sequences for subjective assessments of digital codecs conveying signals produced according to Recommendation ITU-R BT.601
P-910, 1999	Subjective video quality assessment methods for multimedia applications
P-920, 2000	Interactive test methods for audiovisual communications
P-930, 1996	Principles of a reference impairment system for video
EBU - SAMVIQ	Multi-media

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ITU REC. 500-11 QUALITY and IMPAIRMENT

Five-grade scale

	Quality		Impairment
5	Excellent	5	Imperceptible
4	Good	4	Perceptible, but not annoying
3	Fair	3	Slightly annoying
2	Poor	2	Annoying
1	Bad	1	Very annoying



CLASSES OF QUALITY ASSESSMENT

❖ Objective

- ❖ Predictive methods
- ❖ Based on feature measurement

❖ Subjective

- ❖ Use human observers
- ❖ Mean Observer Score - MOS



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METHODS OF QUALITY ASSESSMENT

❖ Objective

- ❖ Fully referenced
- ❖ Reduced referenced
- ❖ No referenced

❖ Subjective – procedures defined in standards

- ❖ DSIS
- ❖ SDSCE
- ❖ DSQCS
- ❖ SSCQE



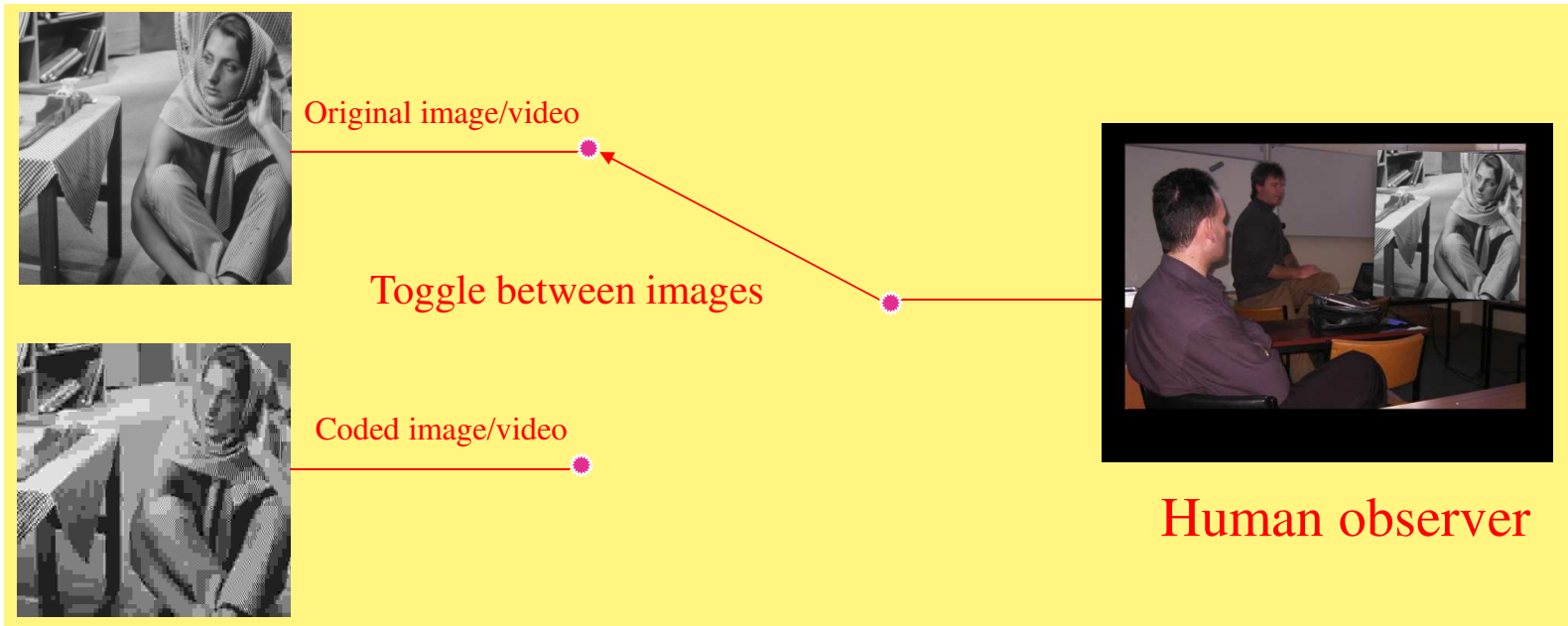
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SUBJECTIVE METHODS

❖ Image quality assessment

❖ Subjective method



MOS – MEAN OBSERVER SCORE

What is MOS?

A subjective quality measure obtain from a number of human observers

❖ Problems with MOS

- ❖ Inconvenience
- ❖ Slow
- ❖ Expensive
- ❖ Poor repeatability

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SUMMARY

- ❖ QoE and Artefacts were defined
- ❖ Dominant Coding artefacts were introduced
- ❖ Discussed the Image and Video Quality Assessment
- ❖ Two image and video quality assessment methods were presented
- ❖ Need for artefact measurement and methods were shown

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THANK YOU

❖ Questions & Comments



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