

Electronic Media – Present and Future

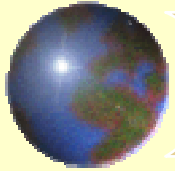
Presented by

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2006.02.10



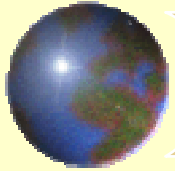
1. Introduction

⊕ What is Electronic Media?

Those deploying **Communications Technologies**,
(excluding print media)

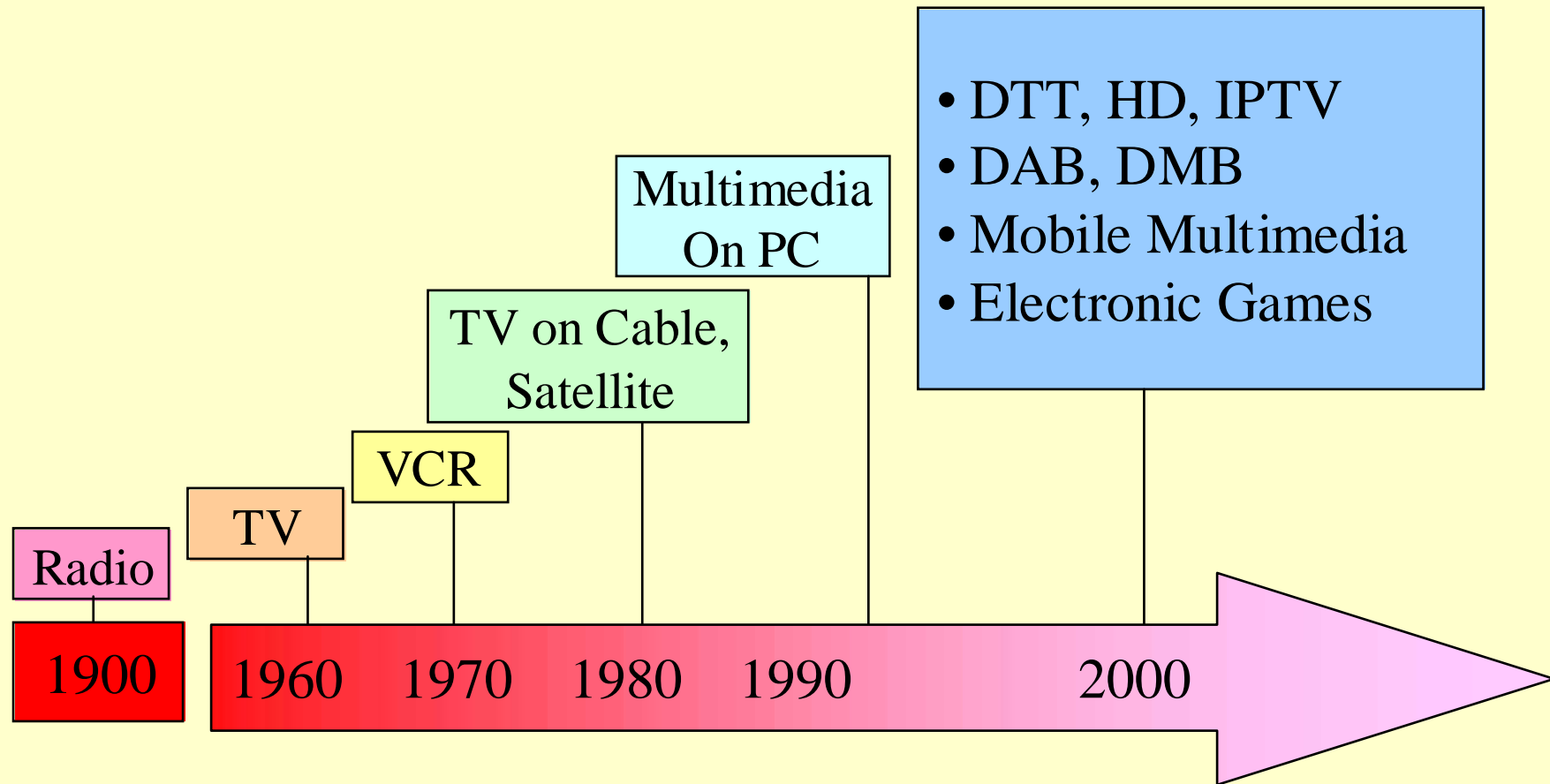
Examples of Electronic Media:

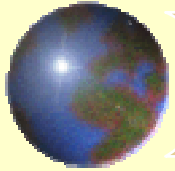
Radio, TV, sound recordings, video recordings,
multimedia



1. Introduction

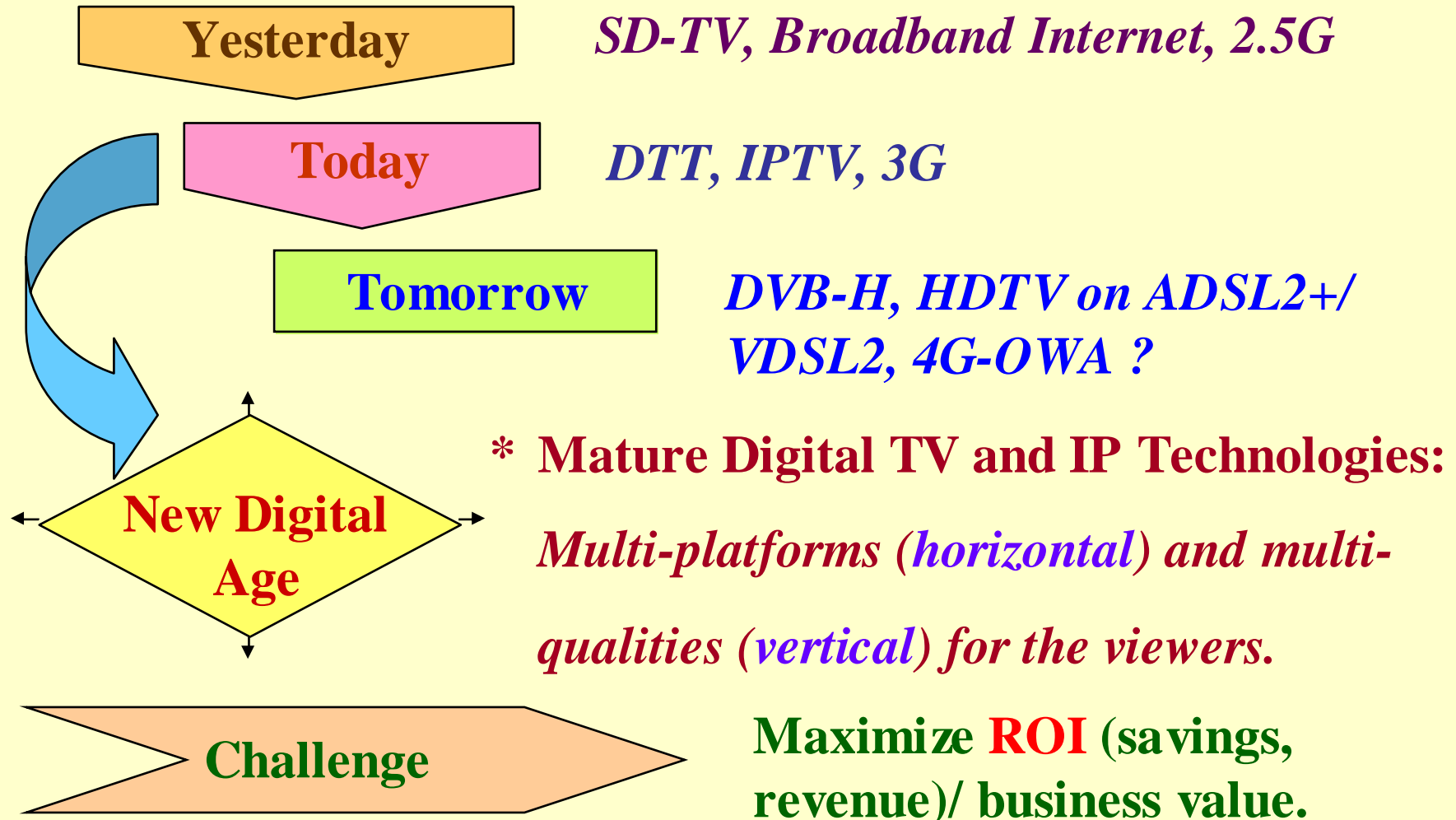
⊕ Electronic Media Developments

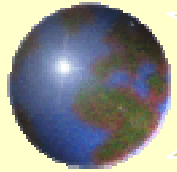




1. Introduction

✚ Triple-play Mix: TV/ IT/ Telecom





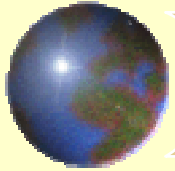
1. Introduction

✦ Convergence

Converging technologies lead to a divergence of viewers' choices.

✦ Quality

Quality: traded-off against mobility, transmission costs. Video bitrates, from 0.2 Mbps (for mobile phones) to over 100 Mbps for HDTV. Quality vs user cost, but technologies provide flexibility, improvements.



1. Introduction

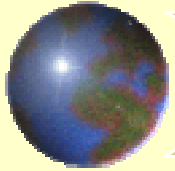
✦ Content is King

Compelling contents can drive people to buy new technologies, e.g. major sports events.

People's habits/ life styles are then gradually changed by the new technologies.

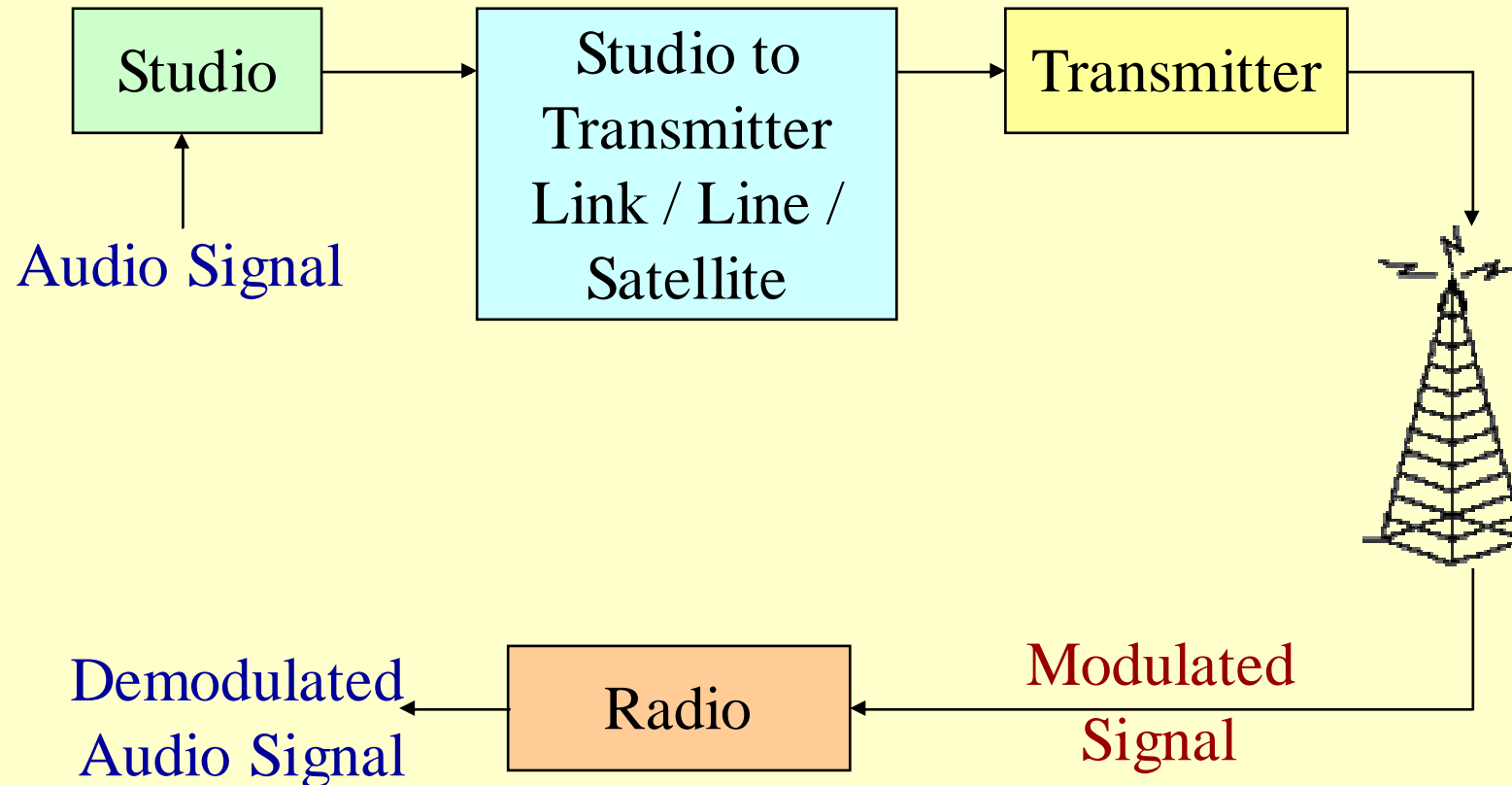
✦ General Trends

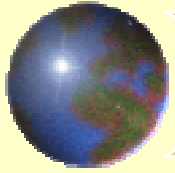
- Ubiquitous: anywhere, anytime, desired form
- Mobility increases
- Threshold of acceptable quality dropping
- Networked environment eg office, home
- Time-shifted viewing/ listening eg PVR, ipod
- Interactive



1. Introduction

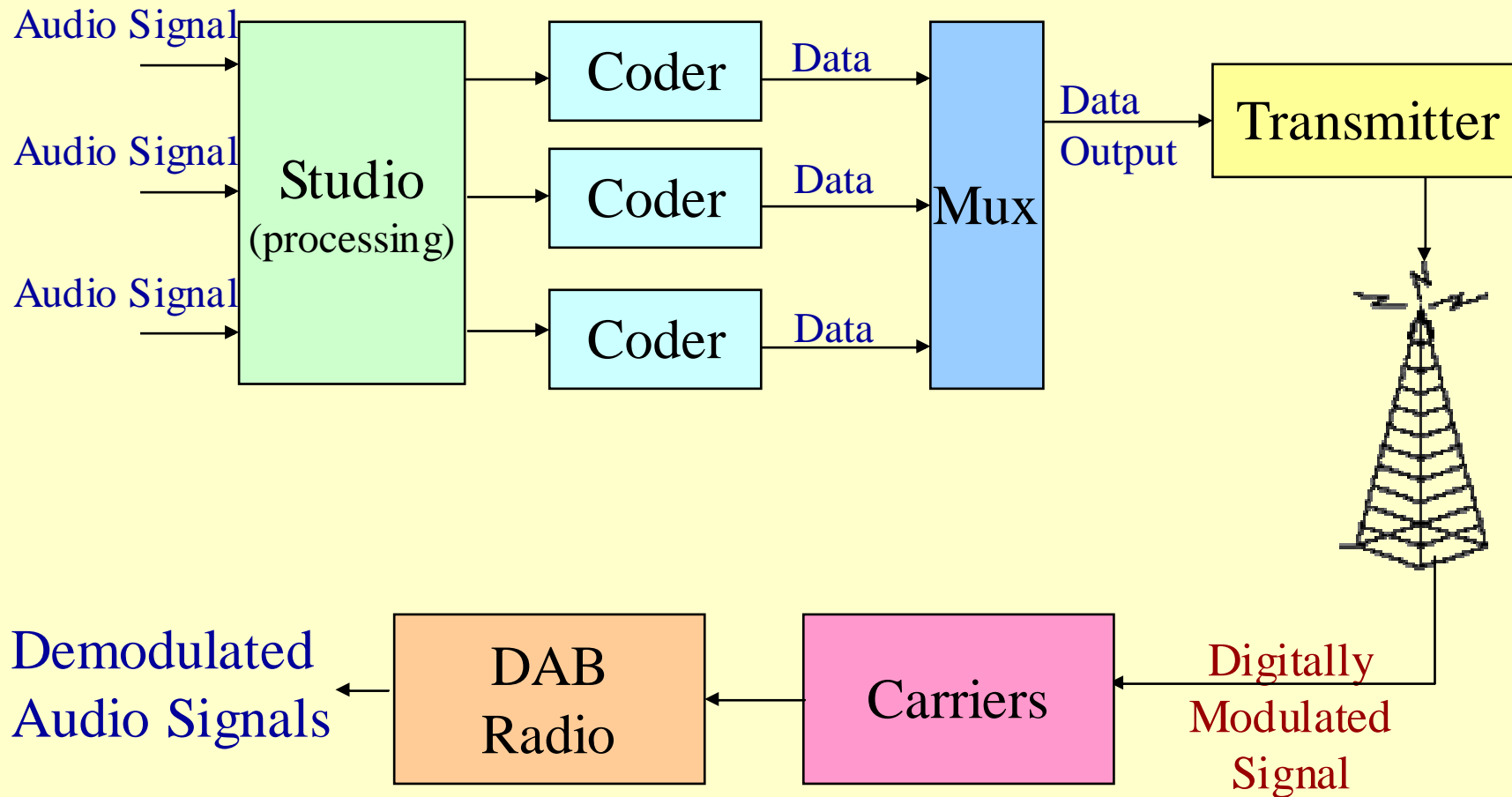
Traditional Analog Broadcast Structure

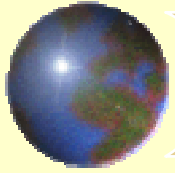




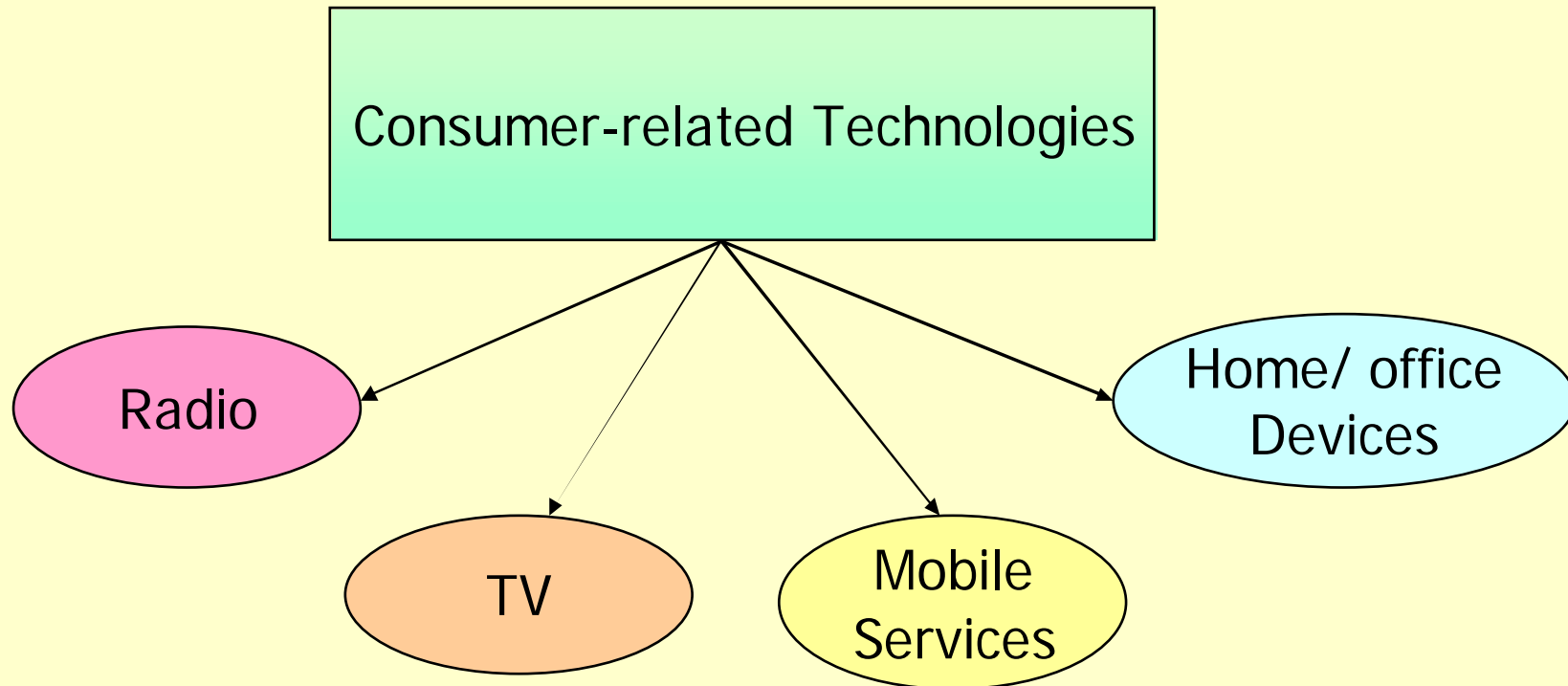
1. Introduction

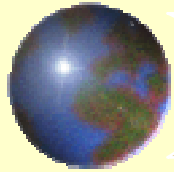
⊕ Digital Broadcast Structure eg DAB





2. *Consumer-related Technologies*





2. *Consumer-related Technologies*

⊕ 2.1 Radio : DAB, DRM, DMB

DAB (Digital Audio Broadcasting)

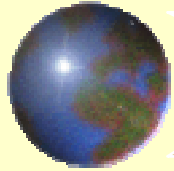
A technology for multi-channel audio broadcasts. Based on European Eureka-147 standard, developed in mid 1990's.

DRM (Digital Radio Mondiale)

An open-source platform for digital radio broadcasting in AM, SW or FM bands. Fits within existing AM channel bandwidth.

DMB (or T-DMB, Digital Multimedia Broadcasting)

A digital system for sending data, radio and TV to mobile devices such as mobile phones. Developed by S. Korea (T-DMB, S-DMB). Not the same as DMB-T, for DTT.

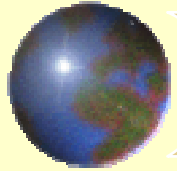


2. Consumer-related Technologies

2.1 Radio - DAB, DRM

Chart 1: Digital Radio Systems – DAB vs DRM

	DAB	DRM
Frequency Bands	VHF Band (174 – 240 MHz), L-band	MW, SW, FM Bands
Useful Data Capacity	1.2 – 1.7 Mbps	8 – 24 kbps
No. of Programs	6, typical	One
Data Services	Limited	Limited
Receiver availability	Very High	Low



2. Consumer-related Technologies

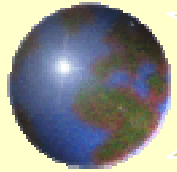
❖ 2.2 TV - DTT

DTT (Digital Terrestrial TV)

An implementation of digital technology to provide

- a larger number of channels (SDTV) and/or
- a better quality of picture (HDTV) and sound (Surround)

through a TV antenna (fish-bone antenna) eg on top of the roof, instead of through cable, satellite dish or phone line.

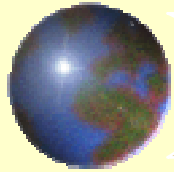


2. *Consumer-related Technologies*

✦ 2.2 TV - HDTV

HDTV (High Definition TV)

- ✦ 16 x 9 aspect ratio. One 8 MHz TV channel → 1 HDTV
- ✦ Studio Standard: mainly 1080/50i in 50Hz countries (HK/China/Europe/Australia).
720/50p may be used, e.g. for sports.
- ✦ Transmission standard: country-dependent
- ✦ Picture information about 5 times that of conventional TV
- ✦ Needs critical camera focusing and attention to the wide aspect ratio. OB can use fewer cameras
- ✦ Compatibility with 4x3 SDTV: some broadcasters use 14x9 or 13x9, in parallel to SDTV sets, by down-converting HDTV.

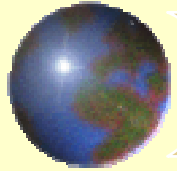


2. Consumer-related Technologies

2.2 TV - DTT / HDTV

Chart 2: World-wide, DTT/ HDTV Transmission

Country	Technical	Progress
China (Mainland)	DMB-T (TDS-OFDM), ADTB-T (OQAM)	DMB-T (Tsing Hua) or ADTB-T (Jiao Tong); system yet to be decided, perhaps by early 2006. CCTV launched HD on Cable in Qingdao and Hangzhou in 9/2005. Analog off : later than 2015.
Europe	Satellite, mainly	Euro1080 HDTV. Germany: Premiere Pay-HD.
USA	ATSC	>16M DTV sets sold. Most TVs have ATSC tuners. >1,525 stations, 211 cities. Analog- off on Feb. 17, 2009.
Canada	ATSC	>1.2M sets. >21 HD channels.
S. Korea	ATSC	>3M sets. 25 hr HDTV per week.

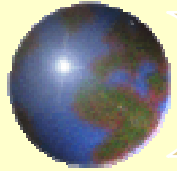


2. Consumer-related Technologies

2.2 TV - DTT / HDTV

Chart 2: World-wide, DTT/ HDTV Transmission (Cont.)

Country	Technical	Progress
UK	DVB-T, 8 MHz	73% coverage. >8M DTT Rx's. BBC to trial HD in 2006 and to introduce HD in 2007.
Australia	DVB-T, 7 MHz	Jan. 2001, DTT commenced. 87% coverage. >160 TX sites. >0.9 M DTT units.
Japan	ISDB-T	6M sets, target to reach 12 M sets in 2006. HD started in 12/2003. Analog off in 2011.



2. *Consumer-related Technologies*

⊕ 2.2 TV - HDTV, Hong Kong

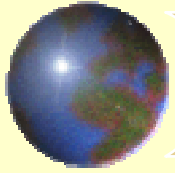
1 MFN (TVB x 2, ATV x 2, SDTV)

2 SFN (TVB x 1, ATV x 1, HDTV)

2 SFN (Reserved, pending SFN study)

❖ **Studio standard:** 1080/ 50i

❖ **Transmission standard:** use DVB-T if China (mainland) does not select a system by end 2006. Maturity of set-top boxes (STB) is an issue. ATV and TVB plan to roll out HD in July, 2007.

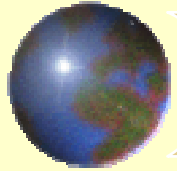


2. Consumer-related Technologies

2.2 TV - HDTV, Hong Kong

	TVB	TVB	ATV	ATV		Analog TV (at present)
	↓	↓	↓	↓		
MFN	TVB	TVB	ATV	ATV		Digital SDTV (simulcast)
SFN1	HD				1 HD	TVB-only (HD: 14 h/day)
SFN2	1	2	3	4	4 SD	ATV only (HD: 14 h/ wk)
	or				or	
	HD				1 HD	
SFN3						Reserved
SFN4						Reserved

Note: for digital SD/HD, viewer needs only one set-top box (STB) or a TV with built-in decoder.

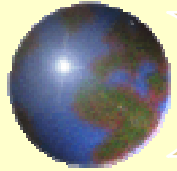


2. Consumer-related Technologies

2.2 TV - IPTV

IPTV (Internet Protocol TV)

- Use of Internet Protocol (IP) for TV transmission over **phone lines** or **optical fibers** to homes, i.e. using **broadband internet**, e.g. Now TV, HK Broadband.
- Flexibility of including **interactive services** and **HDTV**.
- For HDTV, ≥ 8 Mbps is desirable even with MPEG4 AVC coding, needing ADSL2+/VDSL2 technologies, or Fibre to the Home (FTTH).



2. Consumer-related Technologies

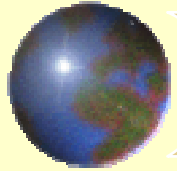
⊕ 2.3 Mobile Services - Telecom. based

Telecommunications based:

GPRS (2.5G), 3G, 4G-OVA (Open Wireless Architecture) for delivery of multimedia, TV etc.

GPRS (2.5G) (General Packet Radio Service)

A mobile data service available to users of **GSM mobile phones**. It is often described as 2.5G, that is a technology between the 2G and 3G generations of mobile telephones.



2. Consumer-related Technologies

⊕ 2.3 Mobile Services - Telecom. based

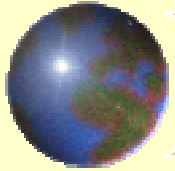
3G (3rd Generation)

- voice data (telephone calls) and
- non-voice data (such as downloading of images, video clips, music, exchanging emails and instant messaging).

4G-OWA (4th Generation, Open Wireless Architecture)

Future wireless access technology. Promises over 100 Mbps (wireless data rate) on an integrated platform.

(IEEE 802.11n for LAN is emerging, promising over 100 Mbps).

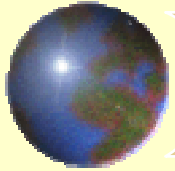


2. Consumer-related Technologies

2.3 Mobile Services - Telecom. based

Chart 3: Telecom based Systems – 2.5G vs 3G

	GPRS (2.5G)	3G
Bands	900MHz, 1.8/1.9 GHz	2GHz & 2.5GHz
Typical Throughput	30 kbps	30 – 384 kbps
Transfer Modes	Packet	Circuit / Packet
Primary Applications	Data	Voice and Data
Coverage	Wide	Local to wide
System expansion costs	Incremental	High



2. Consumer-related Technologies

❖ 2.3 Mobile Services - Mobile TV

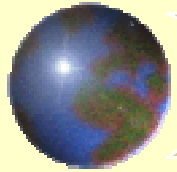
Mobile TV broadcast technologies for hand-sets (mobile phones, PDAs), notebook PCs, etc. May include interactive and audio services.

T-DMB (Terrestrial-DMB)

Evolved from DAB. Allows video, audio and data to be transmitted to mobile devices. More efficient than DAB. Can accommodate DAB audio (MUSICAM).

DVB-H (Digital Video Broadcasting – Handheld)

Tailored for transmitting multiple TV channels to mobile devices. Time-slicing technology conserves battery power of mobile devices.

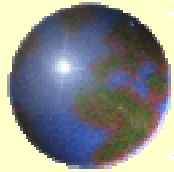


2. Consumer-related Technologies

2.3 Mobile Services - Mobile TV

Chart 4: Mobile TV Systems – DMB vs DVB-H

	DMB	DVB-H
Spectrum Bands	VHF and L-Bands (1.5 MHz bandwidth)	typically in UHF (6-8 MHz bandwidth)
Regulation	Broadcast Licensed	
Typical Throughput	1.4 Mbps	8 Mbps
Transfer Mode	Broadcast	
Primary Applications	Low-bitrate video, audio, data	Video, audio, data
Coverage	Wide	
Network Costs	DMB (similar to DAB), DVB-H (similar to DVB-T)	

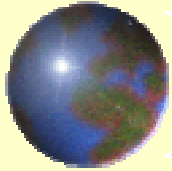


2. Consumer-related Technologies

2.4 Home Devices - DVD

Chart 5: Digital Video Disks – HD DVD vs Blue Ray DVD

	HD DVD	Blue Ray DVD
Video Recording formats	MPEG2, VC1, MPEG4	MPEG2, VC1, MPEG4
Storage Capacity	Single layer: 15 GB Dual-layer: 30 GB Triple-layer: 45 GB (in development)	25 GB for one layer, 50 GB for two layers (higher capacity, using Blue Violet laser)
Sound Channels	Dolby 5.1	

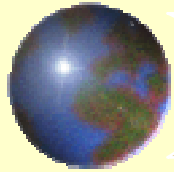


2. *Consumer-related Technologies*

Chart 6: Displays – PDP, LCD, LCOS

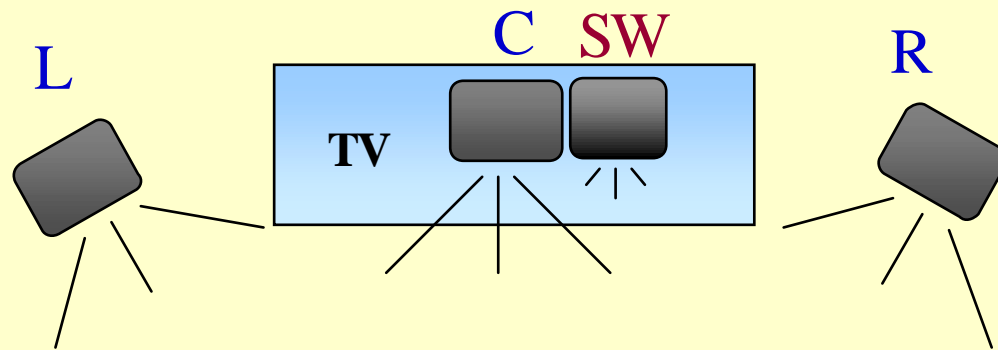
2.4 Home Devices Displays

	PDP (Plasma Display Panel)	LCD (Liquid Crystal Display)	LCOS (Liquid Crystal on Silicon)
Approach	Direct, luminescent	Direct, non-luminescent	Rear-projected TV, reflective
Screen sizes, at present	Up to around 102"	Up to around 82"	Up to around 72". (Less popular due to size)



2. Consumer-related Technologies

2.4 Home Devices – Dolby 5.1 eg for HDTV



Dolby 5.1

L – Left

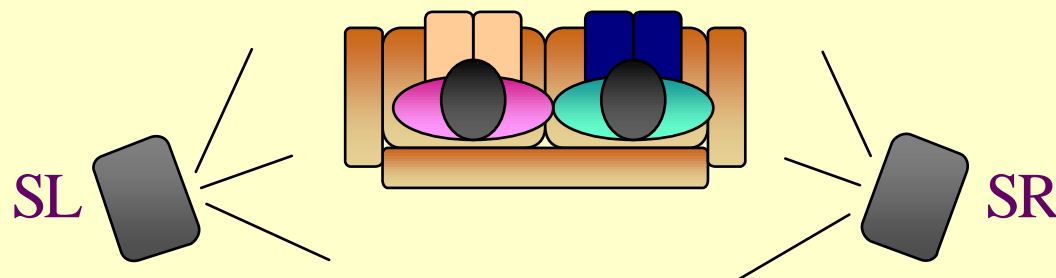
C – Center

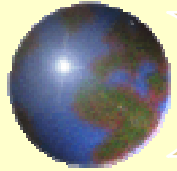
R – Right

SW – Sub-Woofer

SL – Surround Left

SR – Surround Right

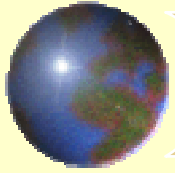




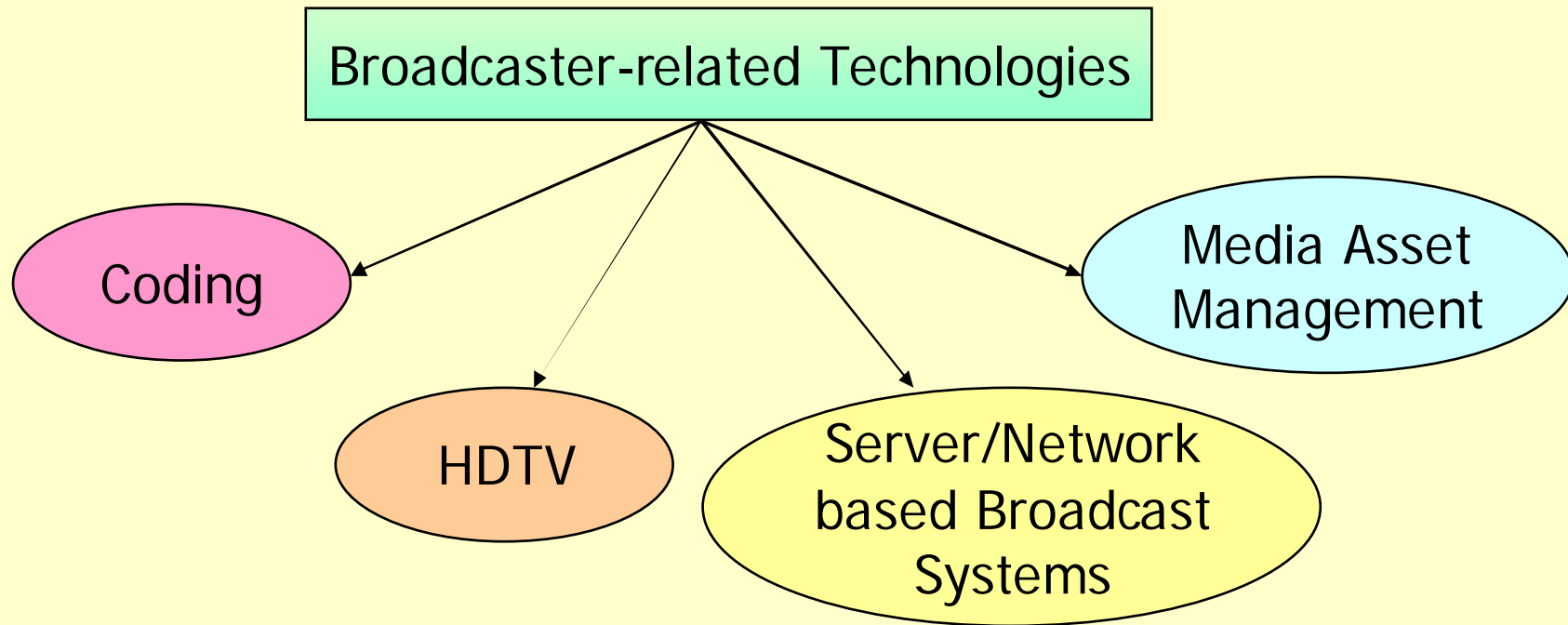
2. Consumer-related Technologies

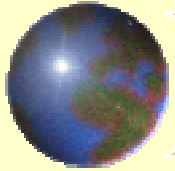
❖ 2.4 Home Devices – Misc.

- ❖ **PVR (Personal Video Recorder):**
 - records TV programs onto a hard-disk
- ❖ Video streaming to PC eg Windows Media 9 (VC1), Real
- ❖ Video/ Audio downloads, e.g. ipod, due to advances in Digital Rights Management (DRM).
- ❖ Home network with large capacity video servers; HDTV distribution among rooms, emerging.
- ❖ Wi-Fi phones using office LAN, emerging.



3. Broadcaster-related Technologies



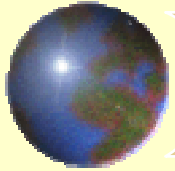


3. Broadcaster-related Technologies

3.1 Coding Technologies - Video

Chart 7: Videos – MPEG2 vs MPEG4 AVC

	MPEG2	MPEG4 AVC (H.264)
Coding Efficiency	Developed in mid 1990's, proven but inefficient . Motion compensation uses 1-2 past pictures.	More efficient , so saving bandwidth. Motion compensation uses up to 32 past pictures.
SDTV	4 – 6 Mbps	1 – 2 Mbps
HDTV	18 – 22 Mbps	~ 8 Mbps

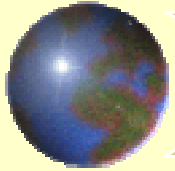


3. Broadcaster-related Technologies

3.1 Coding Technologies - Audio

Chart 8: Audio – MP3, MPEG4 AAC, AAC+

	MP3	MPEG4 AAC, AAC+
Formats	MPEG Layer 3	MPEG4, Advanced Audio Coding
Applications, typical	<ul style="list-style-type: none">- radio field recording- internet streaming	<ul style="list-style-type: none">- 3G and Wi-Fi audio services- internet streaming and downloads- digital Radio- ipod, iTunes, other portables
Coding Technologies	Multi-band filter	Modified MDCT coding, SBR (Spectral Band Replication), for AAC+
Bitrates for good stereo audio, typical	128-192 kbps (depends on encoder used)	<ul style="list-style-type: none">- 48 kbps: CD-quality stereo- 32 kbps: Near CD-quality stereo- 24 kbps: Excellent quality stereo (above figures for AAC+)

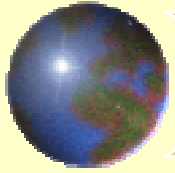


3. *Broadcaster-related Technologies*

3.2 HDTV

Chart 9: Studio Formats - 1080/50i, 720/50p

	1080/50i	720/50p
Scanning	Interlaced (as in conventional TV)	Progressive (as in computer monitor)
Resolution	1920 x 1080	1280 x 720
Usage	Commonly used in HD studios	May be used for TV sports, esp. slow-motion replays



3. Broadcaster-related Technologies

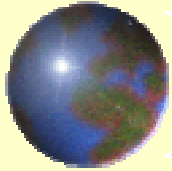
3.3 Server/Network based Broadcast Systems

Broadcast systems increasingly use IT technologies for improved workflows, operational flexibility, ease of upgrading.

However, numerous issues, including:

- System Reliability, especially when software is continually changed upon users' demands
- Network Security and Risk Management
- Functional Obsolescence and Upgrading
- Training, Adaptation by aged staff.

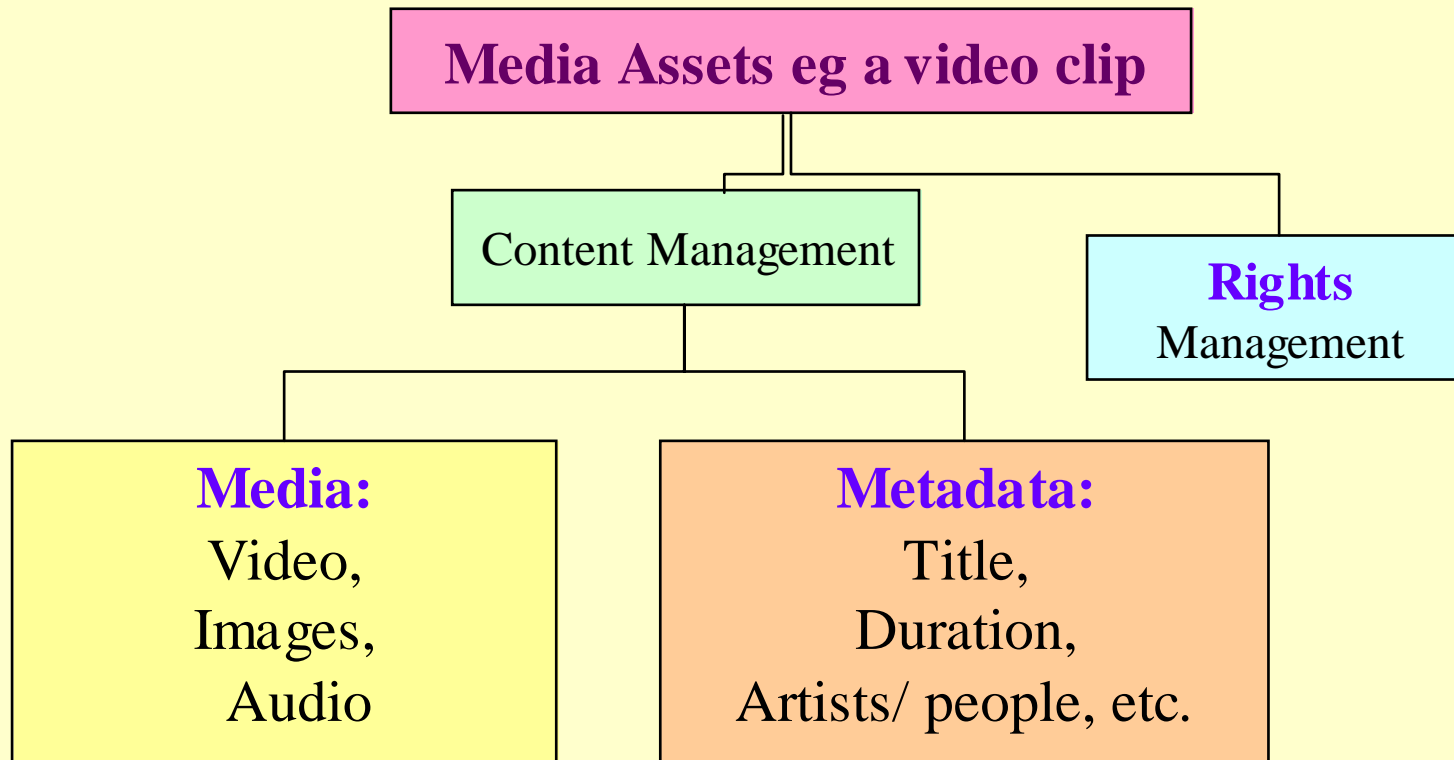
(More information can be provided upon request.)

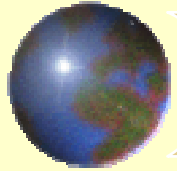


3. *Broadcaster-related Technologies*

3.4 MAM (Media Asset Management)

Media Asset = Media + Metadata + Rights

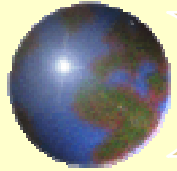




3. Broadcaster-related Technologies

✦ 3.4 MAM (Media Asset Management)

- ✦ MAM depends on **metadata** (data about data).
- ✦ Metadata should be generated at the program ingest stage.
- ✦ **Automatic picture recognition systems** assist in indexing of picture contents, for archival and retrieval.



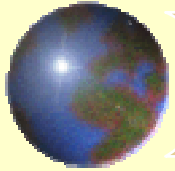
4. *Obsolescence, Economics*

⊕ Fundamental Issues

Technologies are transient but resources are limited. (Technology = mosquito + orange)

Functional obsolescence shortens traditional equipment replacement cycles.

Manufacturers like to push for and to benefit from short replacement cycles, e.g. mobile phones (< 1 year).



4. *Obsolescence, Economics*

⊕ Fundamental Issues

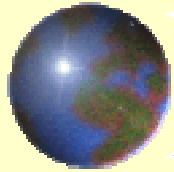
HDTV and economics

- HDTV lagging behind overall in Asia, but economy is growing.
- Chicken vs egg; (govt. + industry) vs consumers; content creation vs consumption; market size vs consumers' costs.
- Economics: predictive of a rapid roll-out of costly digital HDTV.
- Affordability Index = GDP * GDP-per-capita (using PPP method)

GDP → size of economy → strength for driving technology/
content creation.

GDP-per-capita → consumer's ability buy new devices/ contents.

Regulatory, pricing, marketing factors are also influential but
more controllable than GDP.

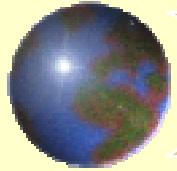


4. *Obsolescence, Economics*

⊕ Fundamental Issues

HDTV development and economics (Cont.)

(2004 Data)	Normalized Index	Economies	GDP, Rank	GDP-per-capita, Rank
1	100.0	United States	1	2
2	66.5	European Union	2	32
3	23.4	Japan	4	21
4	14.4	Germany	6	24
5	11.2	United Kingdom	7	19
6	10.6	France	8	23
7	9.5	Italy	9	30
8	8.6	China (mainland)	3	121
9	6.8	Canada	12	15
10	4.6	Spain	14	39
11	4.0	Australia	17	17



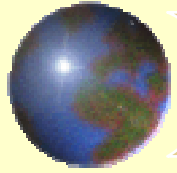
4. *Obsolescence, Economics*

⊕ Fundamental Issues

HDTV development and economics (Cont.)

Observations from AI (affordability index) data:

- USA, Europe, Japan had established DTT/HDTV standards (ATSC, DVB-T, ISDB-T). China (mainland) will be the next.
- In Europe, the ranking order is Germany, UK, France, followed by Italy/ Spain.
- HDTV activity is most intense in economies with an AI index ≥ 3.8 (2004 data) or 3.9 (2005 data), approx.



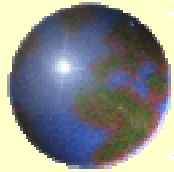
4. Obsolescence, Economics

⊕ Fundamental Issues

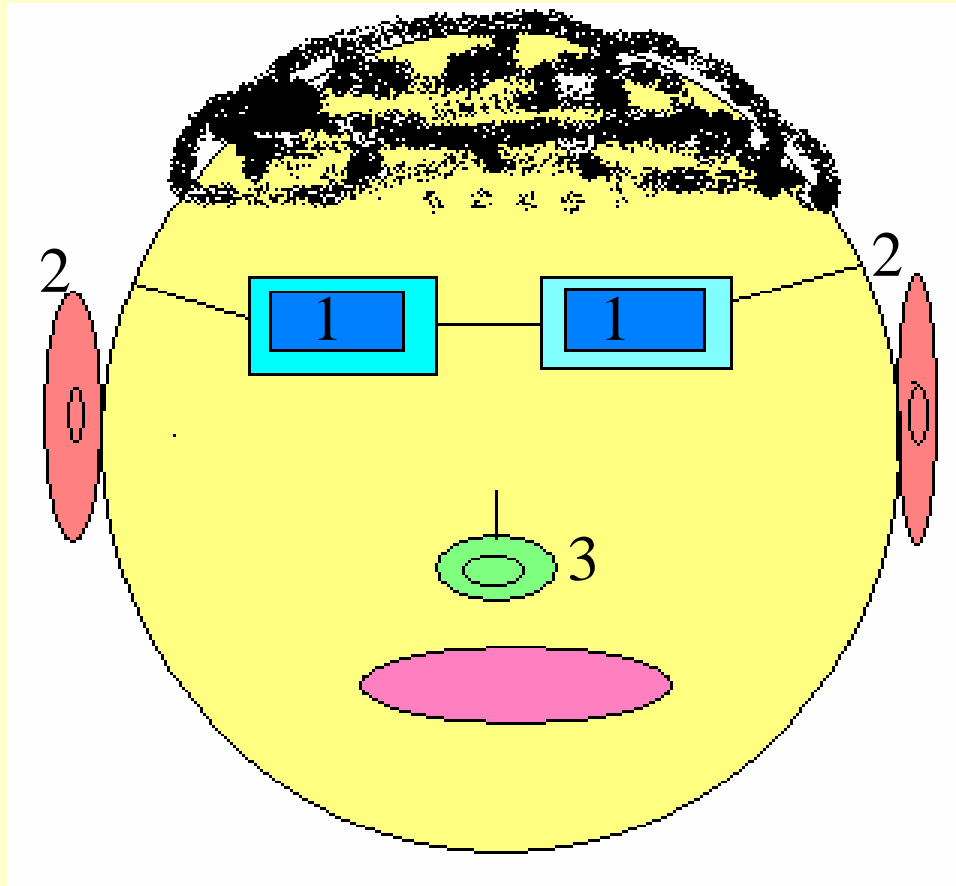
Frequency Spectrum

“Real Estate” in the air, a scarce commodity.

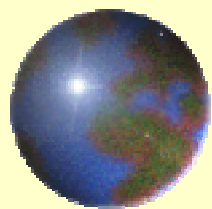
Pressure on terrestrial broadcasters in many countries to go digital so as to vacate valuable spectrum. Financial returns eg via auctioning of spectrum and for development of future telecom/mobile services.



5. *Future Electronic Media Devices?*



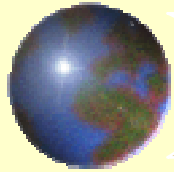
1. HDTV Eye-pods
2. Surround Ear-pods
3. Fragrant Nose-pod,
for cooking programs ?
(All wireless devices)



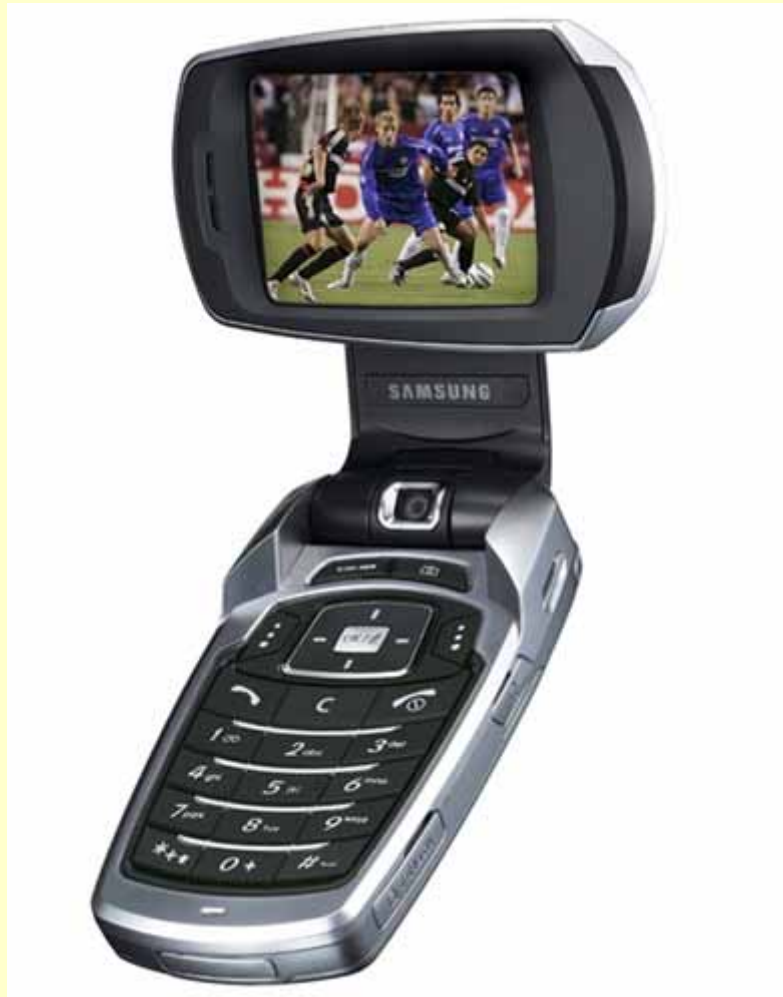
~The End~
Thank You!

For more info.:

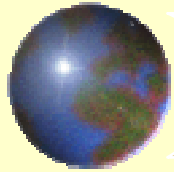
yipjcs@rthk.org.hk



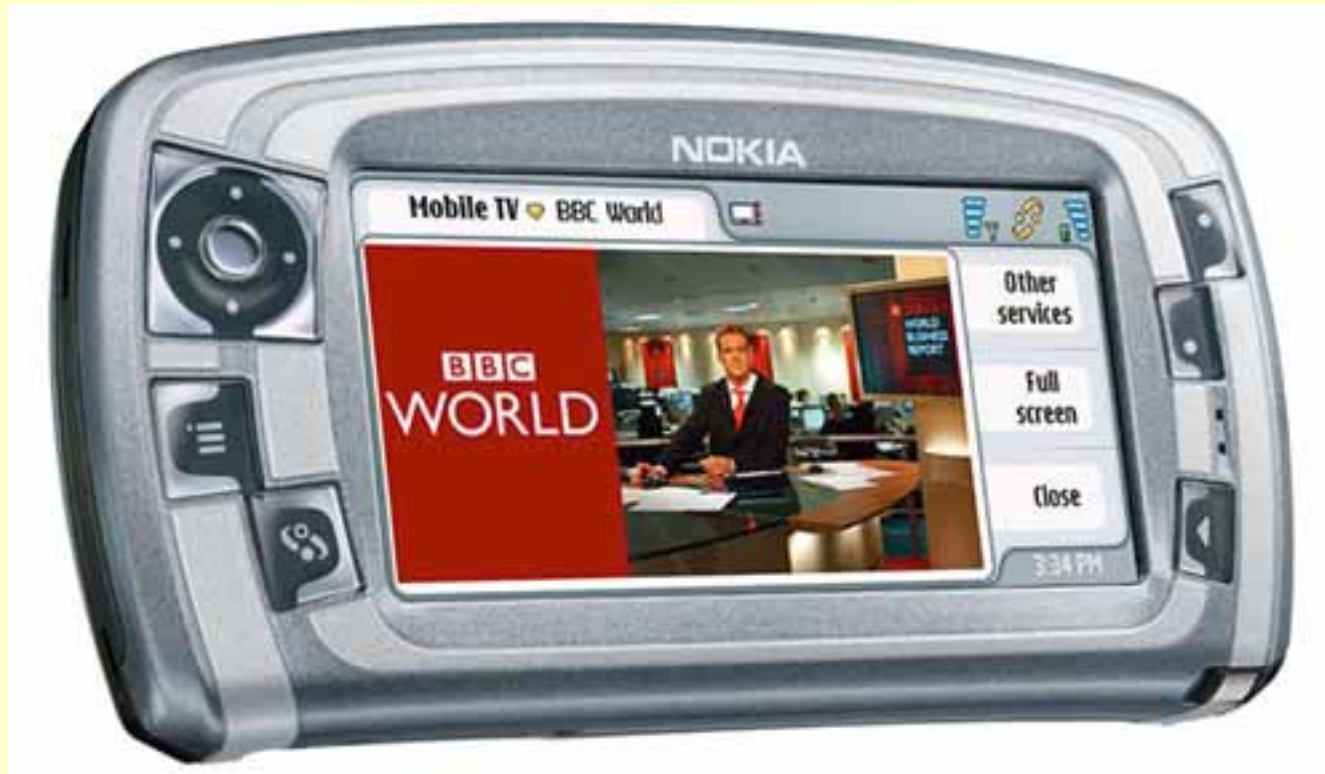
Appendix: Example – T-DMB phone



T-DMB mobile phone



Appendix: Example – DVB-H phone



DVB-H phone