

Interactive Multimedia Services : Trend & Insights

2016

incheon, Korea

Dr AMAL Punchihewa

Director of Technology & Innovation, ABU
Asia-Pacific Broadcasting Union

A Vice-Chair of World Broadcasting Union – Technical Committee (WBU-TC)
Distinguished Lecturer of IEEE Broadcast Technology Society

Interactive Multimedia Services : Trend & Insights

Dr AMAL Punchihewa

Director of Technology & Innovation, ABU
Asia-Pacific Broadcasting Union

A Vice-Chair of World Broadcasting Union – Technical Committee (WBU-TC)
Distinguished Lecturer of IEEE Broadcast Technology Society

Interactive Multimedia Services : Trend & Insights

Dr Amal Punchihewa

PhD, MEEng, BSC(Eng)Hons, CEng, FIET, FIPENZ, SMIEEE, MSLAAS
Postgraduate Studies in Business Administration

Director of Technology & Innovation, ABU
Asia-Pacific Broadcasting Union, Kuala Lumpur, Malaysia

A Vice-Chair of World Broadcasting Union – Technical Committee (WBU-TC)
Distinguished Lecturer of IEEE Broadcast Technology Society

IEEE Broadcast Technology Society

IEEE Broadcast Technology Society

“The technologies to deliver information and entertainment to audiences worldwide, at home and on the go.”



Outline

- Information delivery
- Spectrum efficiency
- Content - Delivery Platforms, Value Chain, Consumption
- What is Broadcasting?
- Television Viewing
- Integration of Broadcast with Broadband
- Technologies of IBB, standards
- Architecture, Model of IBB
- Applications and Services of IBB
- Freeviewplus, Hybridcast
- Summary



Information Engineering

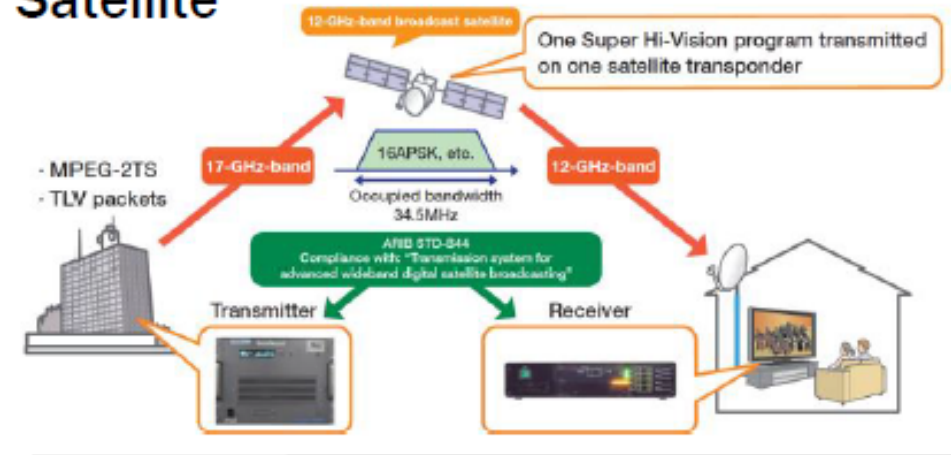
- Channel capacity
- Shannon limit
- Sharing medium
- TV – TDM
- DTH – FDM
- Mobile – CDM
- Fibre – WDM
- Air interface - LDM – Layered Division Multiplexing

$$C = B \log_2 \left(1 + \frac{S}{N} \right)$$

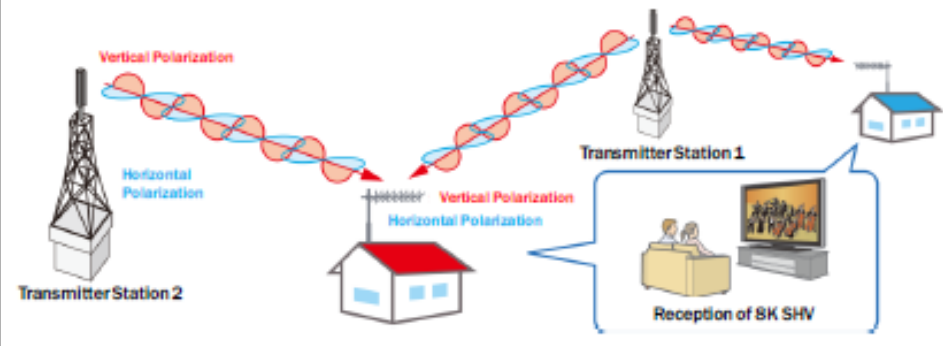
Platforms - Quality Assured

Terrestrial, Cable, Satellite and now IP [Courtesy of NHK]

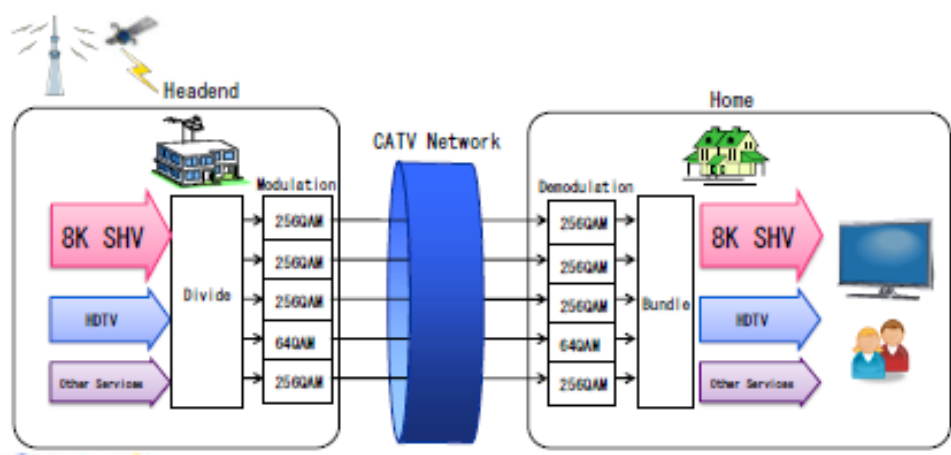
Satellite



Terrestrial



CATV



IP Transmission



What is 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

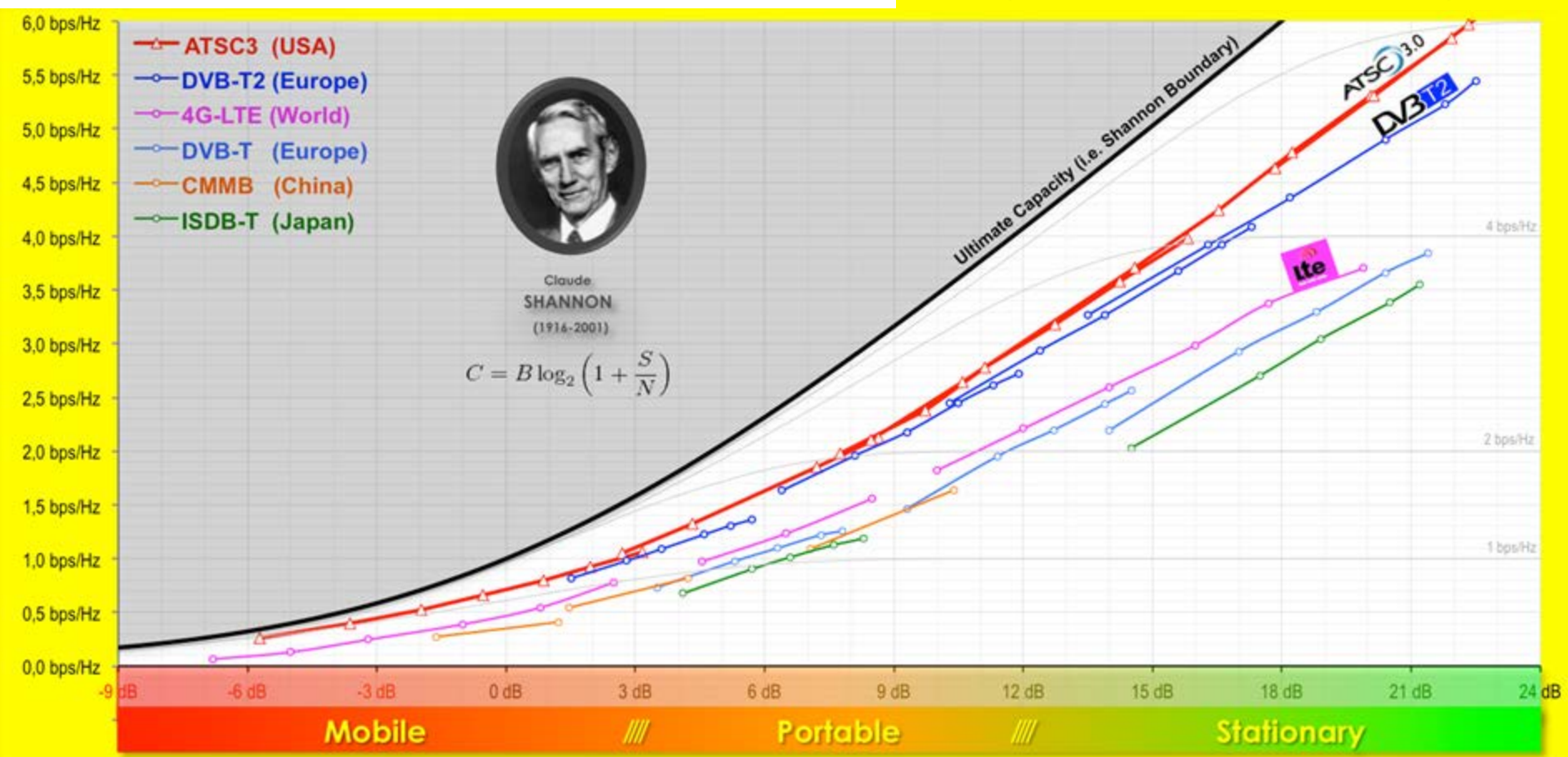
Sampling

- In 1927, Nyquist determined that the number of independent pulses that could be put through a telegraph channel per unit time is limited to twice the bandwidth of the channel. In symbols, $f_p \leq 2B$

Spectrum Efficiency

- For three consumption scenarios - Mobile, Portable, Stationary

Spectrum Efficiencies of Wireless Systems
(1G & 2G Broadcast - wrt - 4G LTE Broadband)



FCC - USA

[Source: <http://www.tvtechnology.com/news/0002/fcc-releases-incentive-auction-clearing-target/278576>]

Initial Clearing Target Band Plan²

21	22	23	24	25	26	27	28	29	9	A	B	C	D	E	F	3	37	3	G	H	I	J	11	A	B	C	D	E	F	G	H	I	J	700 MHz UL
----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	----	---	---	---	---	---	----	---	---	---	---	---	---	---	---	---	---	------------

Number of Paired Blocks: 10

Total Megahertz: 126



TV Content consumption in US

- TV on TV
- Americans like TV on TV. They also prefer live TV, and more are relying exclusively on over-the-air TV.
[Source: Nielsen's "Total Audience Report" for 2Q 2015]

Content (Media)

- Radio
- Television
- New Media – Social media
- Text
- Voice
- Sound
- Video
- Film
-



Content (Media) Delivery Platforms

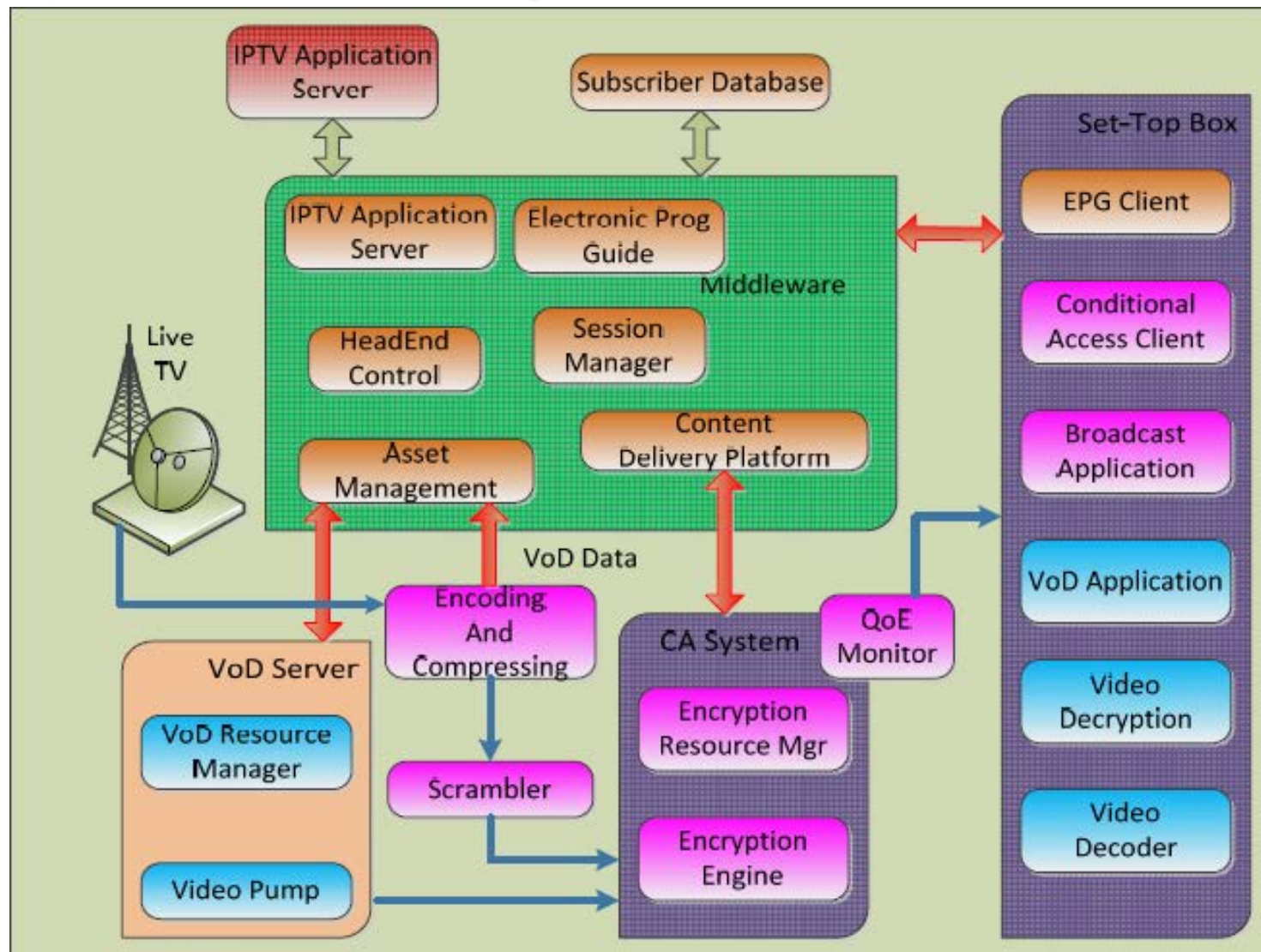
- Terrestrial
- Satellite
- Cable
- IP/Broadband



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]

A Simplified IPTV system - Architecture



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

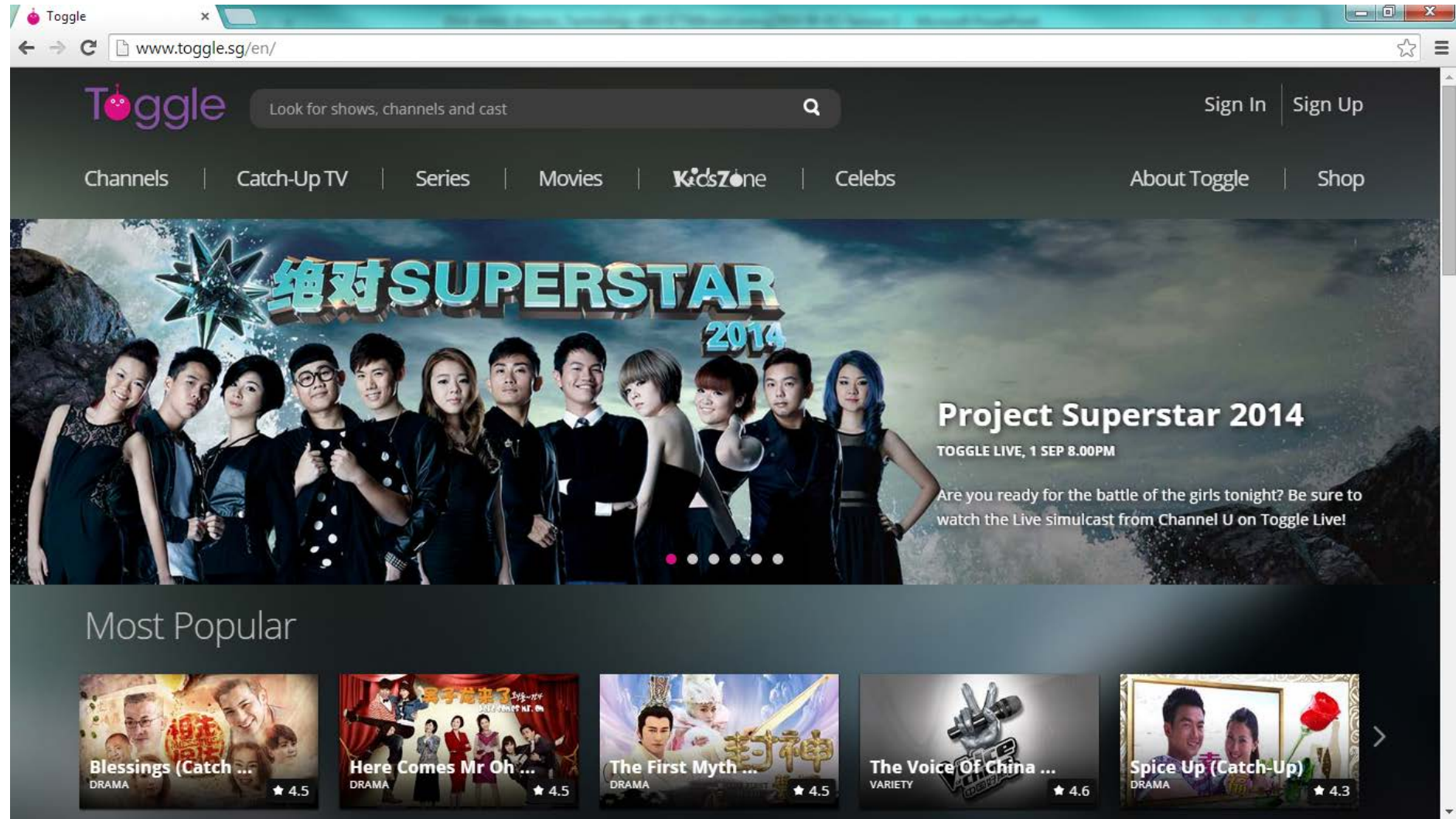


Tonton

The screenshot shows the Tonton website interface. At the top, there is a navigation bar with 'Login | Register', a search bar, and a 'By Title' dropdown menu. The main header features the 'tonton' logo and a vertical sidebar menu with categories: Channels, Shows, Movies, Schedule, Premium, Live TV, News, and tonton Music. The central focus is a featured show titled 'Kerana Terpaksa... AKU RELAKAN' with a 5-star rating. A synopsis on the right reads: 'Perkahwinan Indah telah ditetapkan oleh ibu bapanya. Indah dipaksa untuk berkahwin dengan Saiful. Sehari sebelum hari perkahwinannya, indah telah dianyai oleh kakak tirinya, Zawati dan Zaid. Zawati meninggalkannya di RnR. Kemudian, Indah bertemu dengan Dato' Safiya dan Dato' tersebut menghulurkan bantuan kepadanya. Ketika Indah ...'. Below the synopsis is a 'VIEW SHOW' button and a 'what is... PREMIUM' badge. A 'Most Popular' section is visible at the bottom, displaying a grid of video thumbnails with titles and episode numbers: 'Kerana Terpaksa Aku Relak Episode 22', 'Derhaka Seorang Madu Episode 8', 'Ramadan Jangan Pergi Episode 4', 'Cerita Cinta Kita Episode 9', and 'Azam Ramadan Su Episode 8'. Each thumbnail includes a play button icon and a heart icon for likes.



Toggle from MediaCorp Singapore



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

Difference between IBB and TV+Web

- Application life cycle
 - Some apps. start and stop automatically
 - The quiz app. launches automatically when the quiz programme starts
 - It is terminated automatically at the end of the programme
- Synchronization with progress of a TV programme
 - Presentation changes in accordance with progress of a TV programme
 - The app. receives and processes trigger signals over broadcast
 - Accurate cross-stream synchronization with broadcast signal
- Integrated user experience
 - Totally designed presentation with a TV programme

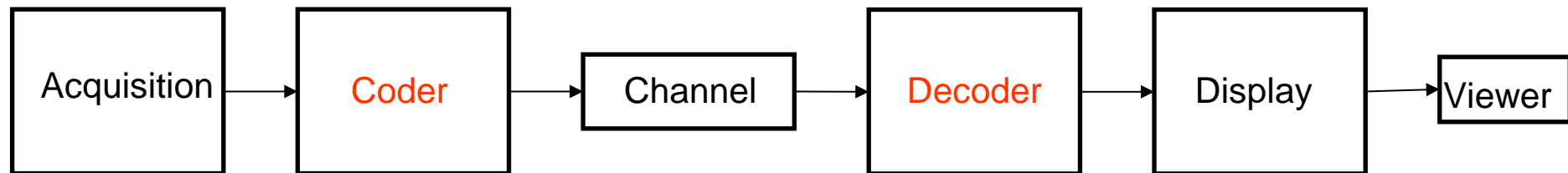
Therefore IBB

- IBB – Integrated Broadcast-Broadband
- Recent advancement of broadband technologies enable
 - High speed delivery
 - Server side processing
 - Inter-device communication



Content (Media) Value Chain - end2end

- Complete chain from capture to receiver need to be digital to realize the full advantage of digital

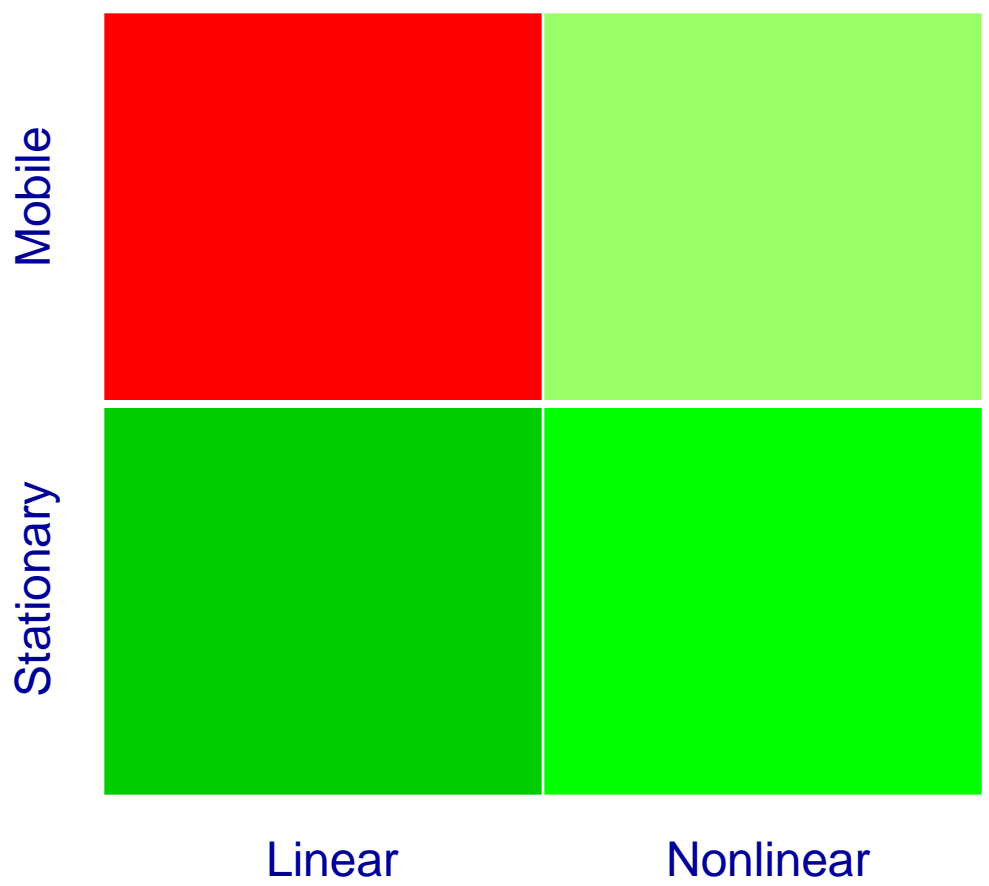


- Visuals and audio are acquired using digital cameras
- Source and Channel encoding are done on video and audio data
- Digital receiver receives digitally processed signals



Content/TV consumption to be served

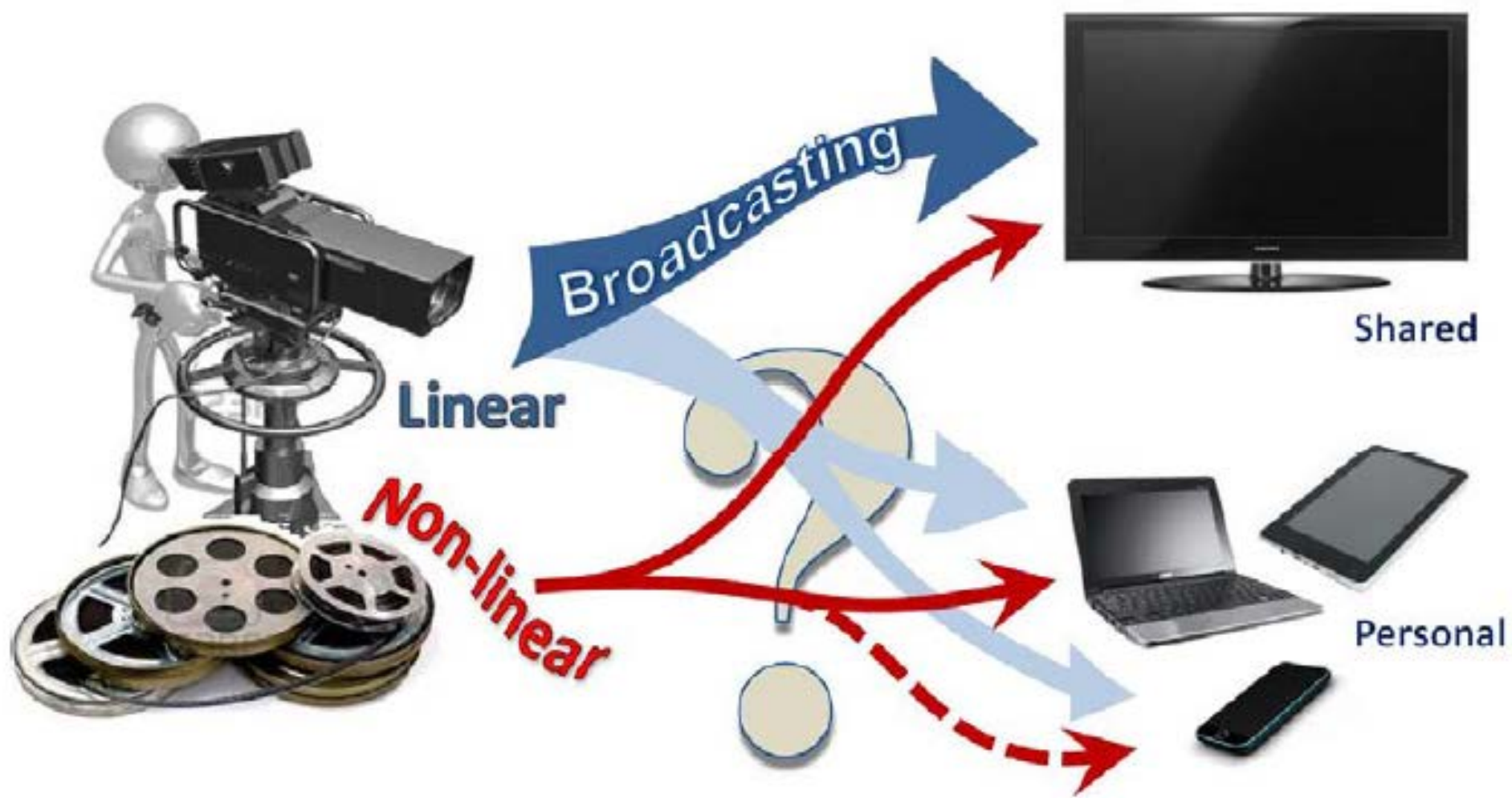
- Stationary vs. Mobile
- Linear vs. Nonlinear



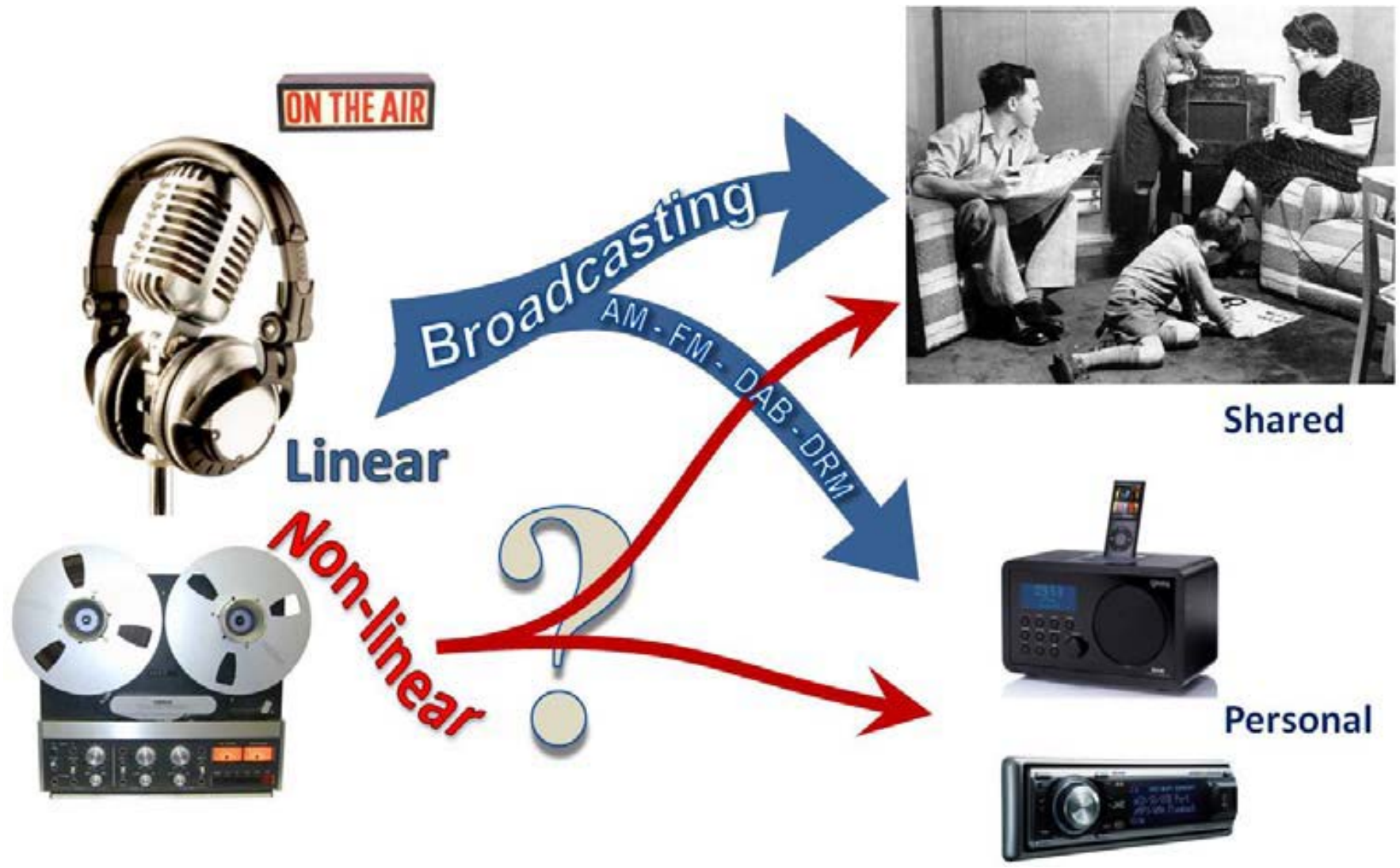
Source: Dr Amal Punchihewa © MMRG



How to deliver linear & non-linear TV content



How to deliver linear & non-linear Radio content



Classification

	Video service with managed QoS	Video service with unmanaged QoS
(Semi interactive) traditional broadcast networks	Traditional 1 	
(Interactive) integrated networks	Wired IBB 2 	OTT
	Wireless IBB 3 	OTT - wireless
(Fully interactive) duplex networks	4 IPTV	5 OTT 6 Wireless OTT

Copyright Reserved
Adapted from ITU
© Amal



Media (Content) Industry

- Demographics – mixed – young and aging nations
- Geography – borderless – satellite and OTT
- Economic development
- Disposable income
- Growth
- Innovation
- NGTV - UHD TV (UHD TV-1 and UHD TV-2)
- NG Transmission stds?? ATSC 3.0



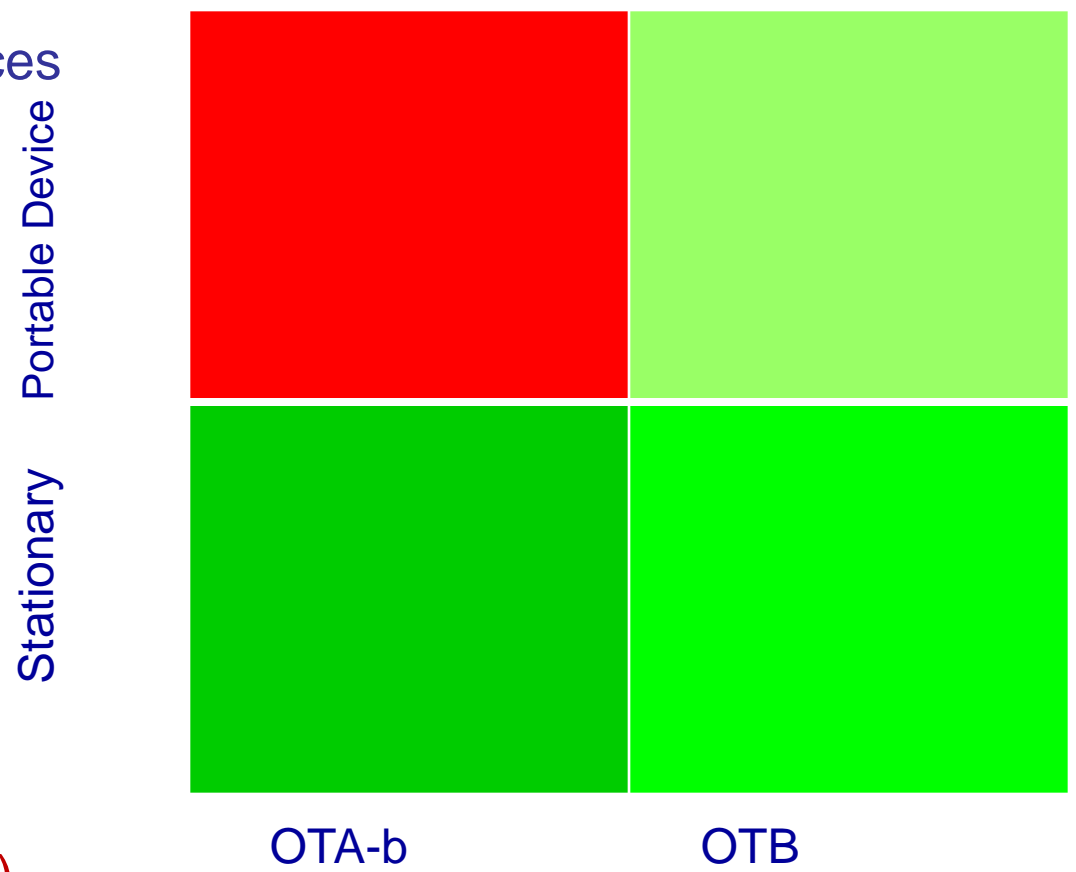
How to deliver and access media/content ?

- Over-the-air (OTA) – most efficient
- Over-the-cable (OTC) – most secured
- Over-the-broadband or Over-the-top (OTT) – growing form of delivery

- How to access content?
 - Free-to-access
 - Pay-to-access

Content (Media) consumption to be served

- Stationary vs. Portable Devices
- OTA-b vs. OTB



Legend

OTA-b Over-the Air (Broadcast)

OTB – Over-the-Broadband

Source: Dr Amal Punchihewa © MMRG



Casting – Information delivery

- **Unicast** is the term used to describe communication where a piece of information is sent from one point to another point. In this case there is just one sender, and one receiver.
- **Multicast** is the term used to describe communication where a piece of information is sent from one point to a set of other points.
- **Broadcast** is the term used to describe communication where a piece of information is sent from one point to all other points. In this case there is just one sender, but the information is sent to all receivers.

Network Architecture

- Internet - network of networks - enables P2P Communication
- Mobile/Cellular are networks - enables P2P Communication via BS (Base Station)
- Both above networks are not designed for broadcasting
- Mobile/Cellular networks - for unicasting
- Internet – for unicasting and multicasting
- Broadcasting NWs has been designed to broadcast – Radio, Television and Data Broadcasting (NWs are broadcast networks by design)
 - Generally, Architecture is high tower high power (with small Tx)

Digital Broadcasting Transmission Technologies

- DVB
- ISDB
- ATSC
- DTMB

- Delivery
 - Terrestrial
 - Satellite
 - Cable
 - Virtual pipe - IP

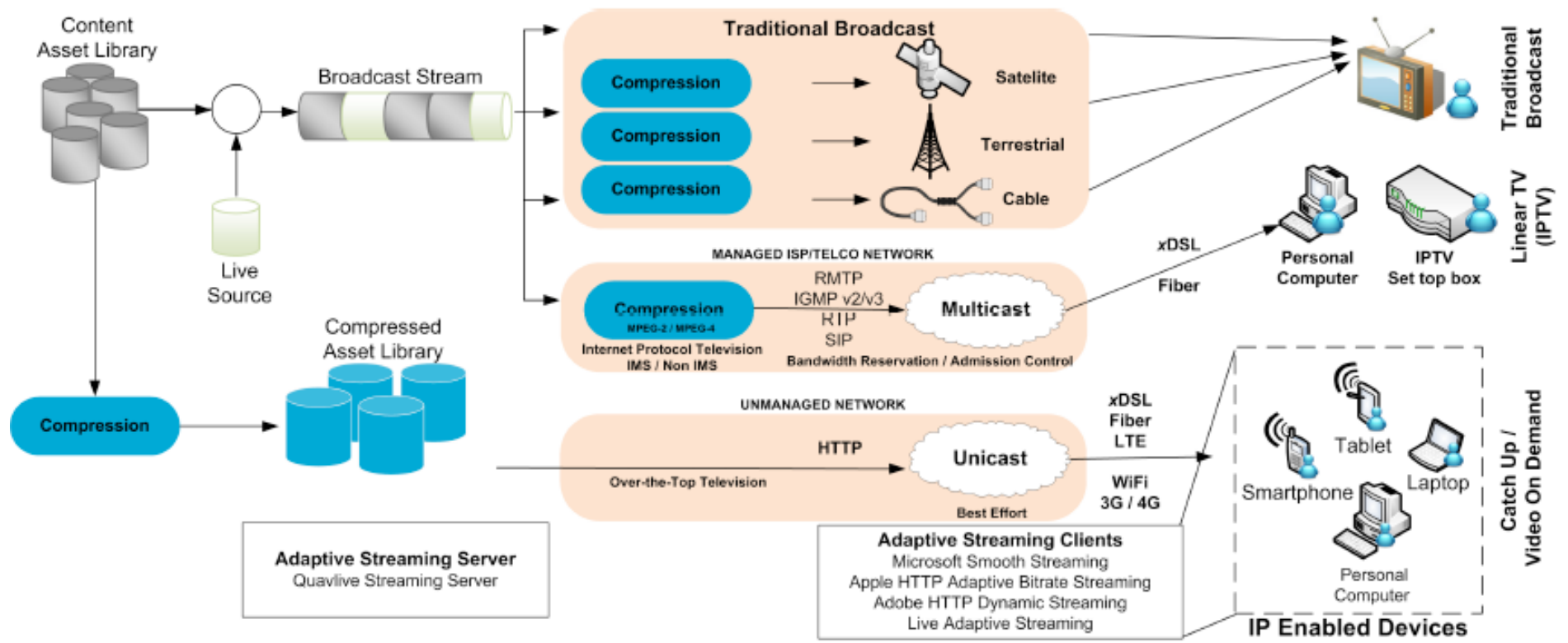
- DAB
- DAB+
- T-DMB

- Delivery
 - Terrestrial
 - Satellite



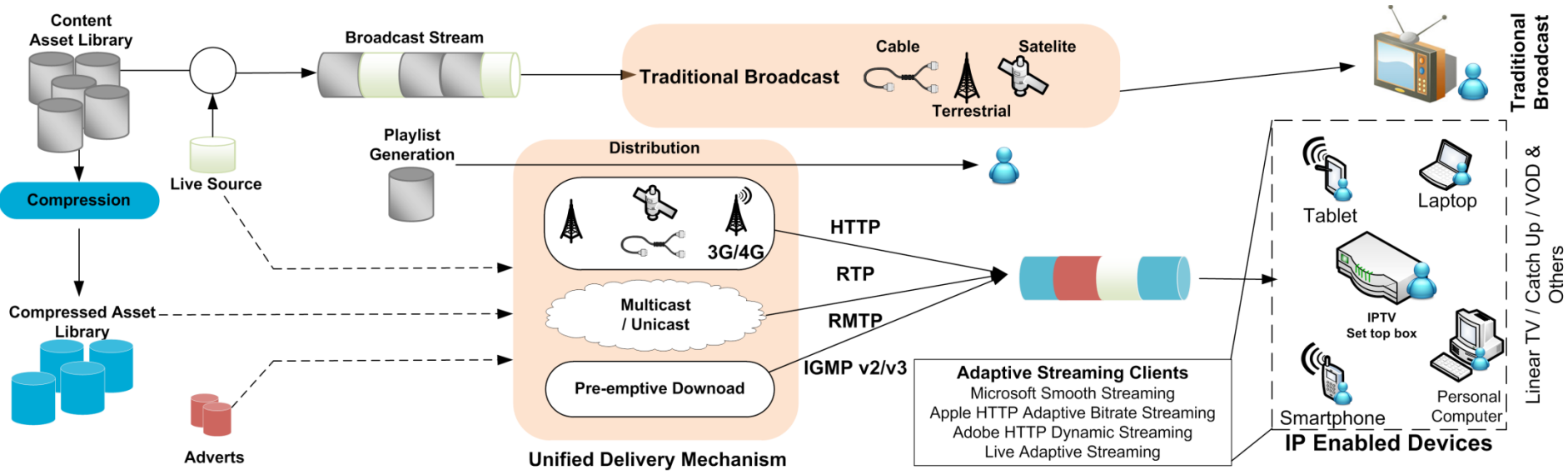
Multimedia delivery techniques

Current multimedia delivery techniques across managed and unmanaged IP networks



An unified architecture

Unified architecture



Traditional Broadcasting

- Linear TV
 - At scheduled times, missed it then catch the delayed version, ...
- Public or commercial
 - Funding or business model, FTA, adverting, License fee, subscription, ...
- Terrestrial, Satellite, Cable
 - Now cloud, IP etc. ...
- Return channel
 - One-to-many service, no return channel
- Telephone, SMS, email and the Internet
 - Return channel for interactivity – request, comments, voting,.....



DTV Standards

- **ATSC - Advanced Television System Committee in USA**
 - Currently in USA and Canada
 - Mainly Terrestrial standard, extended to other forms such cable
- **ISDB – Integrated Services Digital Broadcasting**
 - Mainly in Japan, Brazil and some other south American countries
 - Extended to forms such as terrestrial, cable and satellite standard
- **DVB – Digital Video Broadcasting**
 - Most of the countries in the world
 - Developed through a consortium known as DVB in Europe
 - Many variants or forms of DTV operations
- **DTMB – Digital Television Broadcasting System - China**



Transmission standards

- Following table gives the transmission standards overview extracted from the “Guidelines for the Transition from Analogue to Digital Broadcasting”, ITU, page.186, 2010. Please study reports from the ITU website - <http://www.itu.int/publ/D-HDB-GUIDELINES.01-2010/en>

Standard	Modulation	Description in Report ITU-R BT.2140 ⁶	Recommendation ITU-R BT.1306 ⁷	Applicable standards
ATSC	Single carrier 8-VSB	Brief: part 1 section 2.6.2.1 Detailed: part 2, section 1.5	System A; annex 1 table 1a	A/52,A/53, A/65, A/153
DTMB (also referred to as ChinaDTV)	Multi carrier OFDM	Brief: part 1, section 2.6.2.2 Detailed: -	-	GB 20600-2006
DVB-T	Multi carrier OFDM	Brief: part 1, section 2.6.2.4 Detailed: part 2, section 1.6	System B; annex 1 table 1b	EN 300 744
ISDB-T	Multi carrier Segmented OFDM	Brief: part 1, section 2.6.2.5 Detailed: part 2, section 1.8	System C; annex 1 table 1c	ARIB STD-B31 ABNT NBR 15601



Digital Broadcasting Standards

Interactive Television

ETS 300 800 Return channels in CATV systems (DVB-RCC)

ETS 300 801 Network-independent Interactive protocols (DVB-NIP),

ETS 300 802 Return channels in PSTN / ISDN systems (DVB-RCT),

ETS 300 813 Interfacing to PDH networks,

ETS 300 814 Interfacing to SDH networks

Conditional Access

EN50221 Common Interface for conditional access and other applications,

TS101 197 Technical specification of SimulCrypt in DVB systems

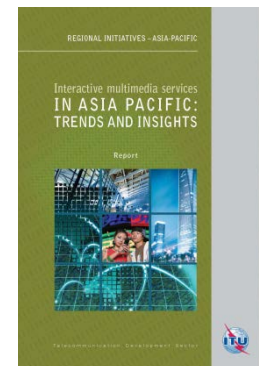
Subtitling **prETS 300 743** Digital broadcasting systems for television, sound and data services; Subtitling systems

Interfaces **prETS 300 813** DVB interfaces to PDH networks,
prETS 300 814 DVB interfaces to SDH networks,
prETS 300 815 DVB interfaces to ATM networks

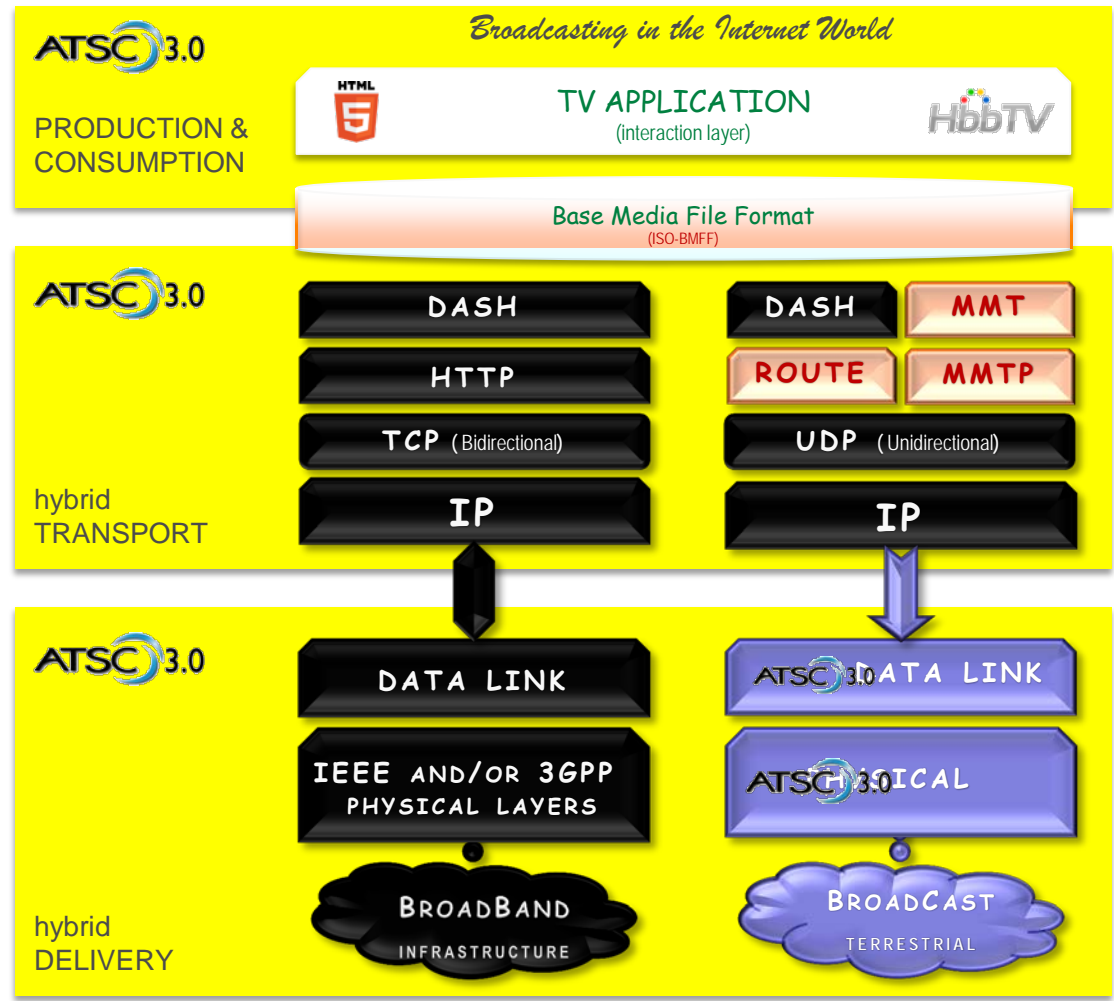
Smooth A2D & maximise the digital dividend

Expectations of ITU:

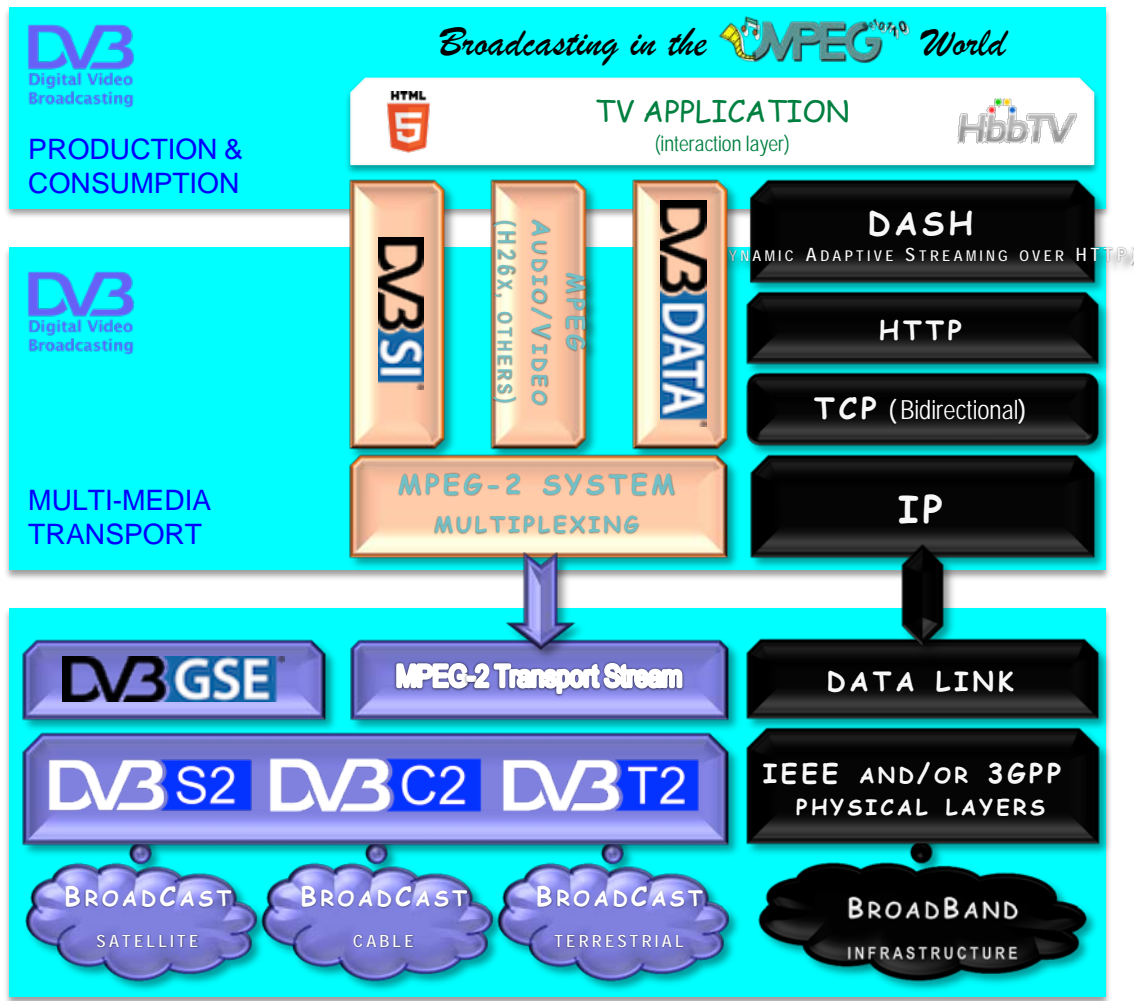
- Policy and regulatory frameworks for digital terrestrial broadcasting, including mobile television and spectrum **refarming** due to the digital dividend
- Digital broadcasting master plans for transition from analogue to digital broadcasting, including **mobile TV** and **IPTV**
- Appropriate mechanisms for conversion from analogue to digital archives and mechanisms for sharing of content
- Provision of assistance in the field of **interactive multimedia services to broadcasters** in the Asia-Pacific region



Broadcasting in Internet world - ATSC 3.0



Broadcasting in MPEG world



Classification

	Video service with managed QoS	Video service with unmanaged QoS
(Semi interactive) traditional broadcast networks	<p>Traditional 1</p>	
(Interactive) integrated networks	<p>Wired IBB 2</p>	OTT
	<p>Wireless IBB 3</p>	OTT - wireless
(Fully interactive) duplex networks	<p>4</p>	
	<p>7</p>	
	<p>5</p>	Internet TV
	<p>6</p>	OTT
		Wireless OTT

Copyright Reserved
Adapted from ITU
© Amal

Summary and Recommendations

- OTT – over unmanaged networks, are improving
- IPTV – less penetration
- IBB – middle ground
- HbbTV, Hybridcasting, HTML-5 Smart TV platform,..
- Technologies are evolving
- How we build infrastructure using such Technology will determine the services
- Regulation especially policies will play a key role in it
- Assurance to access to information - **No information divide (Dr AMAL Punchihewa)**
- Less harm to the society



Interactive Multimedia Services : Trend & Insights

Dr Amal Punchihewa

PhD, MEEng, BSC(Eng)Hons, CEng, FIET, FIPENZ, SMIEEE, MSLAAS
Postgraduate Studies in Business Administration

Director of Technology & Innovation, ABU
Asia-Pacific Broadcasting Union, Kuala Lumpur, Malaysia

A Vice-Chair of World Broadcasting Union – Technical Committee (WBU-TC)

Distinguished Lecturer of IEEE Broadcast Technology Society