Drivers for new digital television services

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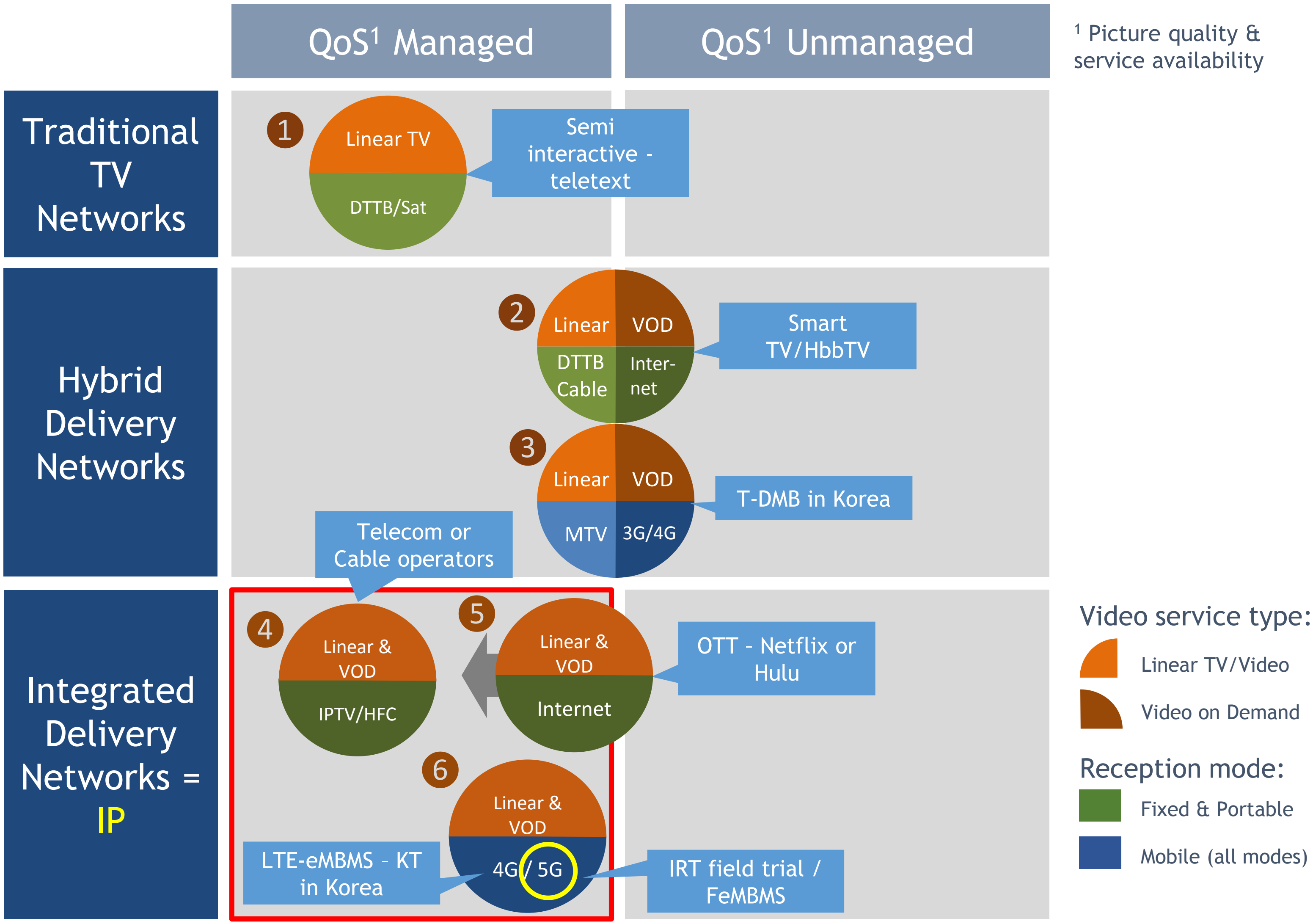
Agenda

Topics

1. Video based services
2. Technology changes
3. Consumer changes
4. Regulatory changes

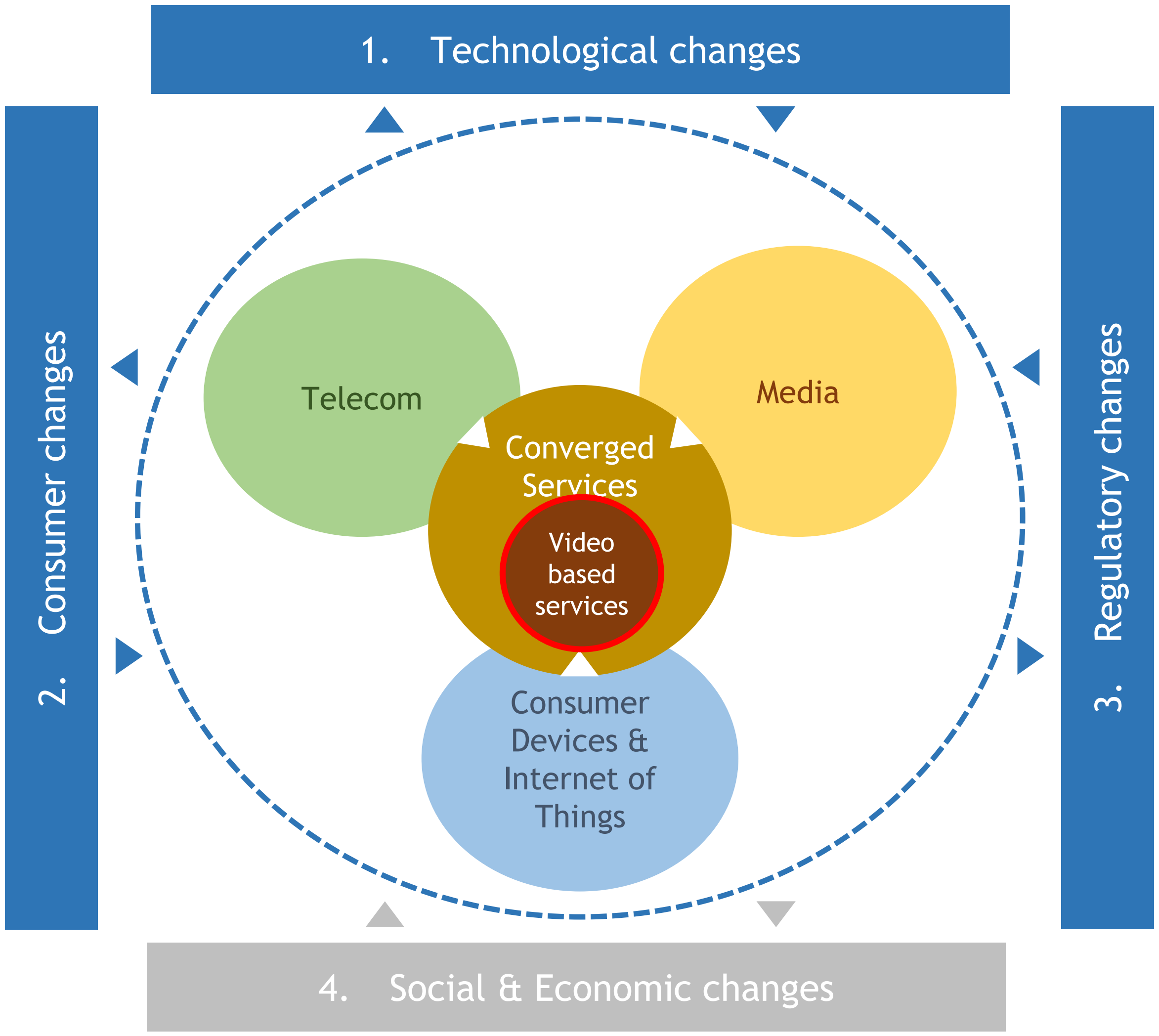
1. Video based services

Wide scope of video based services



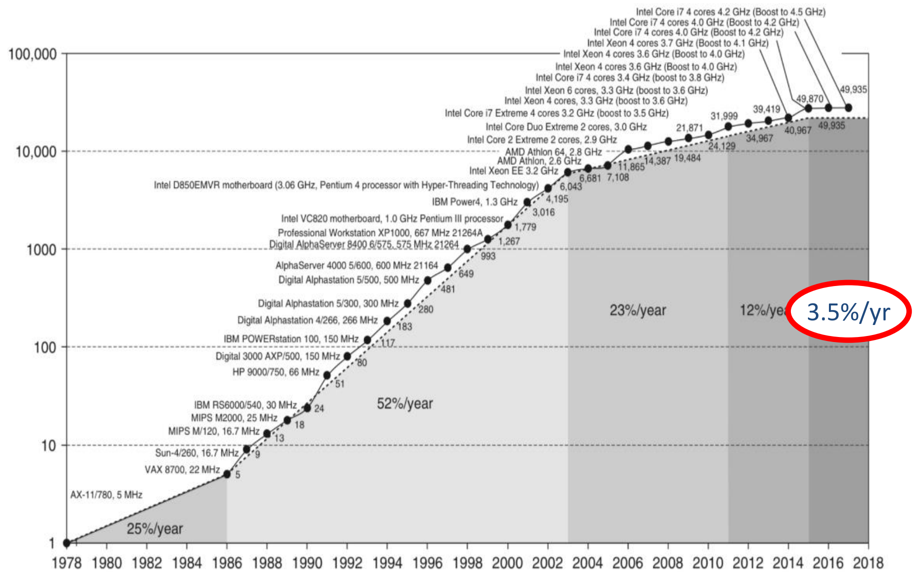
1. Video based services

Drivers

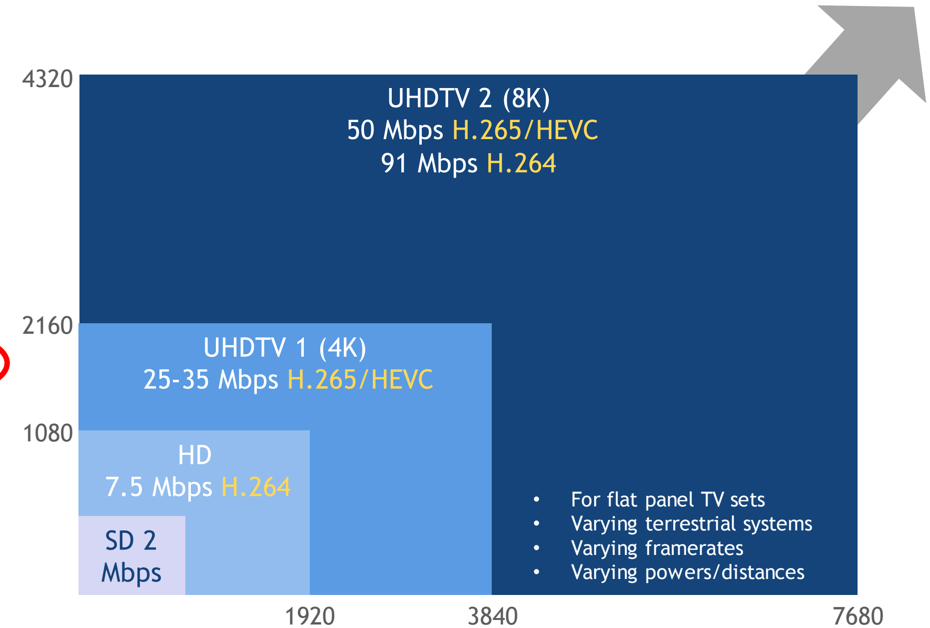


2. Technology changes

Capacity gap approaching in a further maturing OTT market



Source: Computer Architecture: A Quantitative Approach (2017)



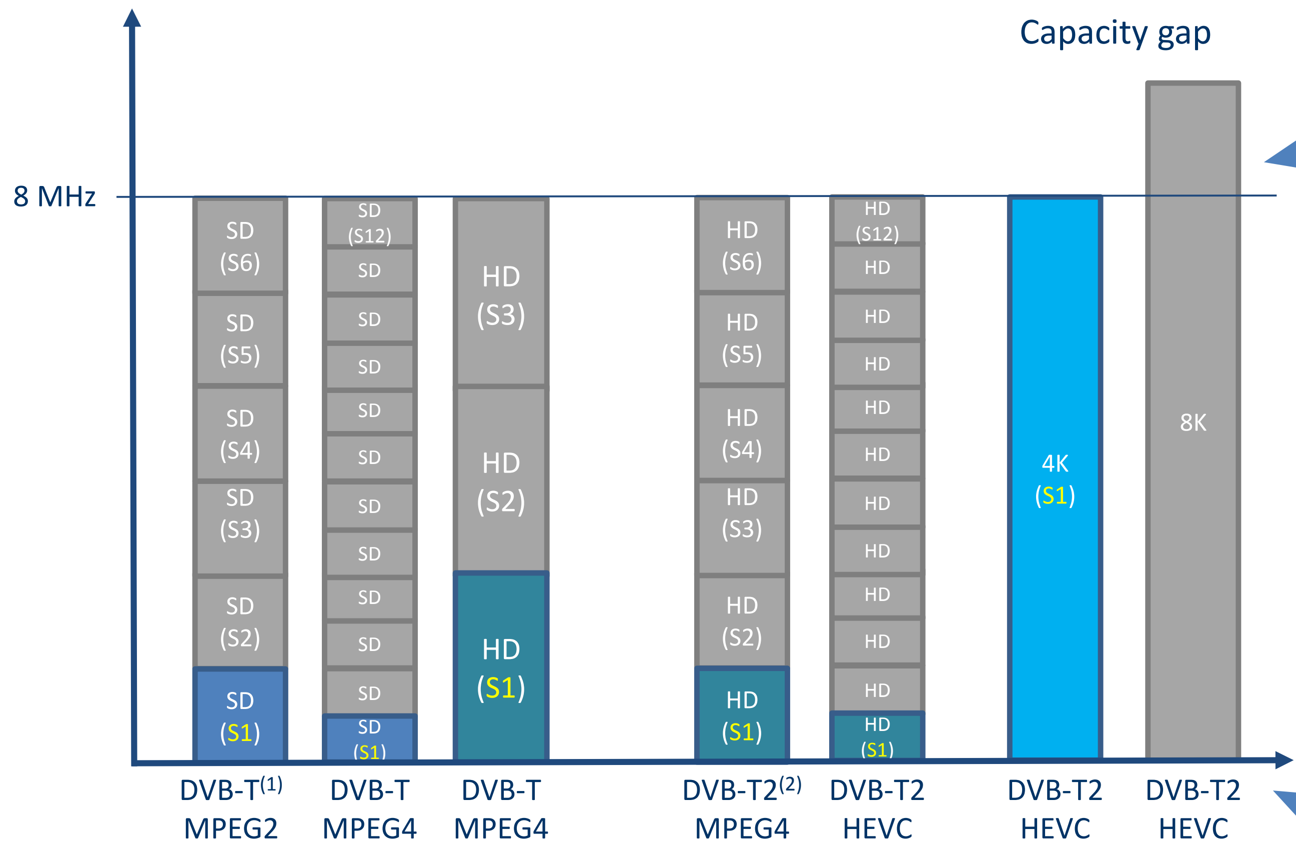
Source: ITU

- UHD video delivery is the key driver of demand for more bandwidth
- OTT video consumption to grow further from current 20% (of all video consumption)(1)
- Bandwidth in the fixed local loop can be increased:
  - VDSL2/Vectoring, DOCSIS 3.1, Fibre (XG PON/NG PON2)
- CDN datacentre deployment and processor capacity the limiting factors

(1) Digital UK and RTL Germany research showed 80% of viewing is live and recorded TV, via traditional delivery (2017)

2. Technology changes

Capacity gap on terrestrial platforms is already there



For flat panels at home (not for mobile)

LTE eMBMS has similar transport efficiency (Shannon limit!)

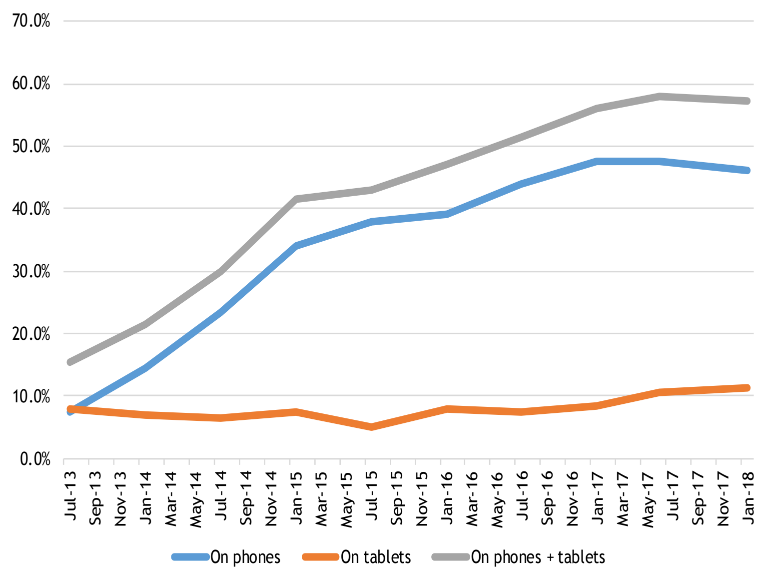
(1) Net bit rate: 24 Mbit/s (64QAM, CR 2/3)
(2) Net bit rate: 40 Mbit/s (256 QAM, CR 2/3)

IRT field test (5G FeMBMS) – to replace terrestrial broadcasting

3. Consumer changes

VOD and TV anywhere and anytime

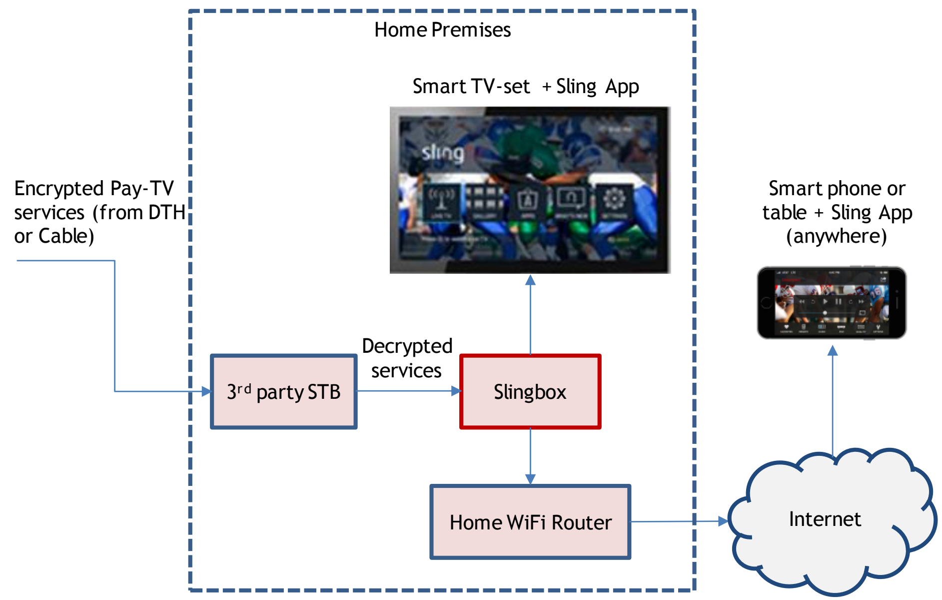
Mobile video consumption share (1)



(1) Share of plays on all IP connected devices

Source: OOYALA Global Video Index Q1 2018, adapted

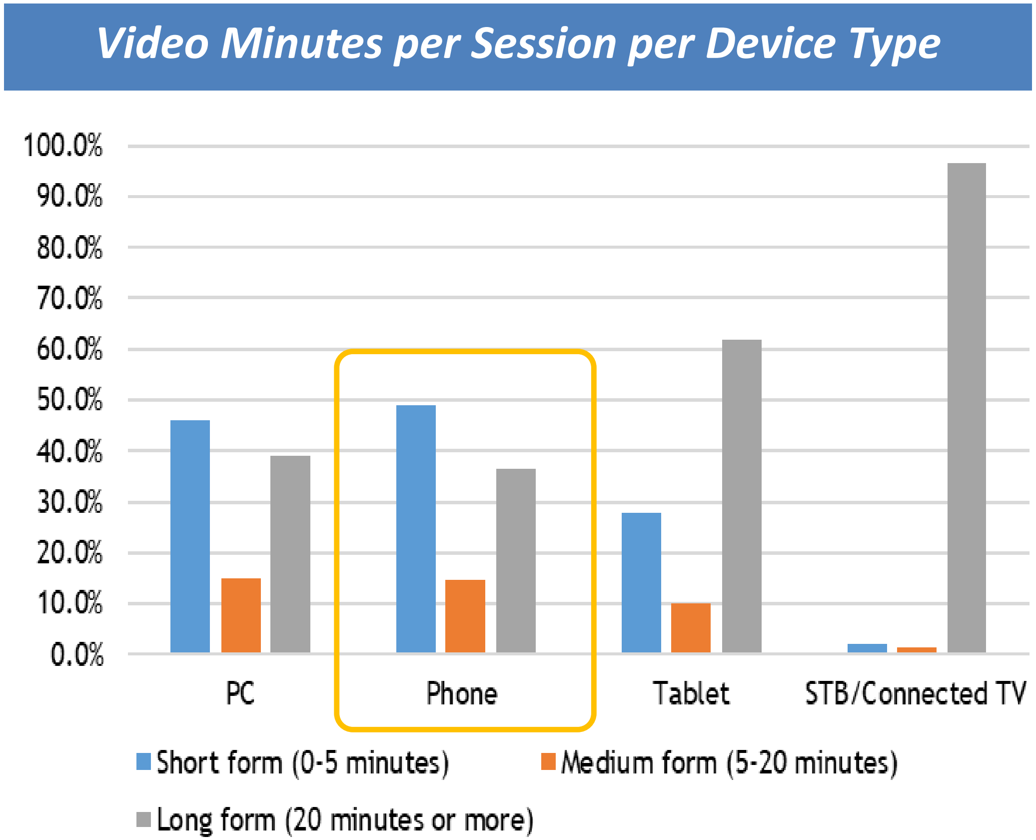
New video (redistribution) services



Source: Sling Media, adapted

3. Consumer changes

Mobile VOD is complementary to live TV

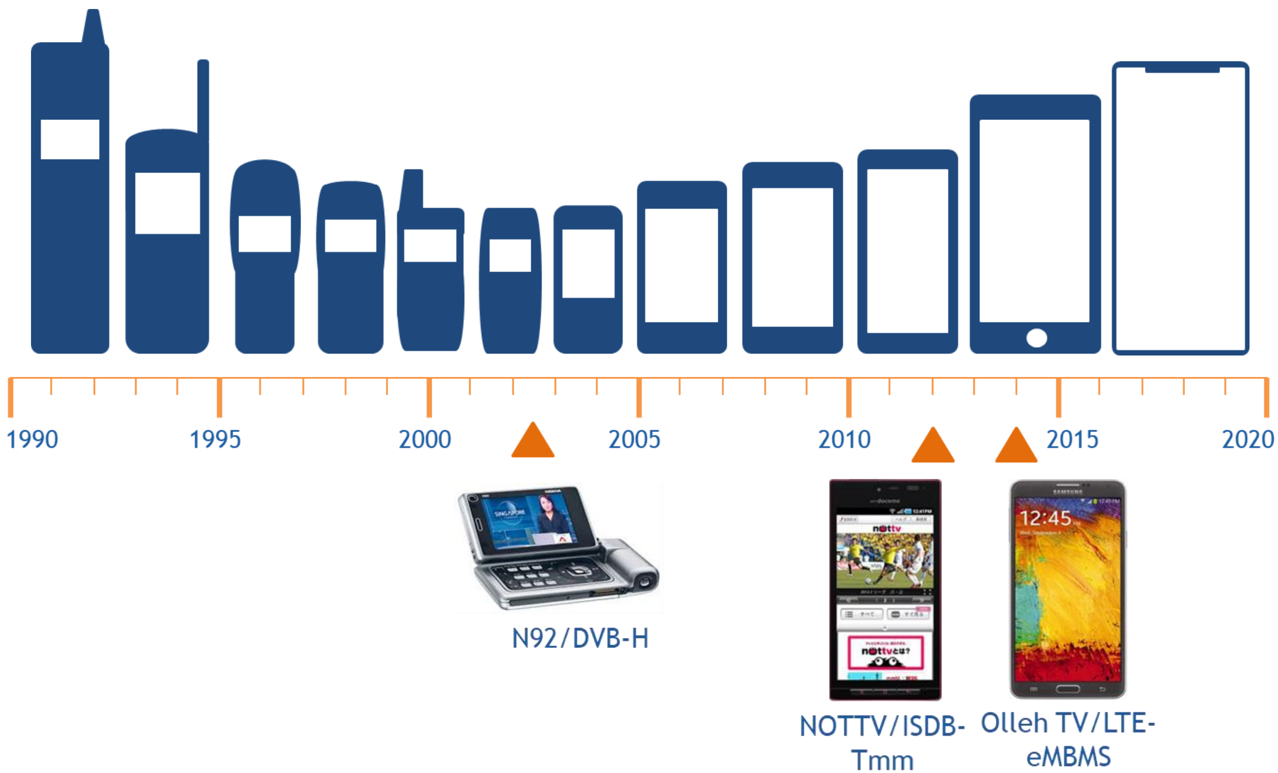


Source: OOYALA Global Video Index Q2 2017, adapted

- Mobile VOD seems not to cannibalise TV revenues:
  - Only idle time is used (when on the move)
  - TV is long-form and mobile is short-form video
  - 4/8K (UHDTV) viewing not on mobiles
- However, mobile VOD viewing may change viewing habits also at home
- Media-meshing between mobile VOD and live TV forms an opportunity

3. Consumer changes

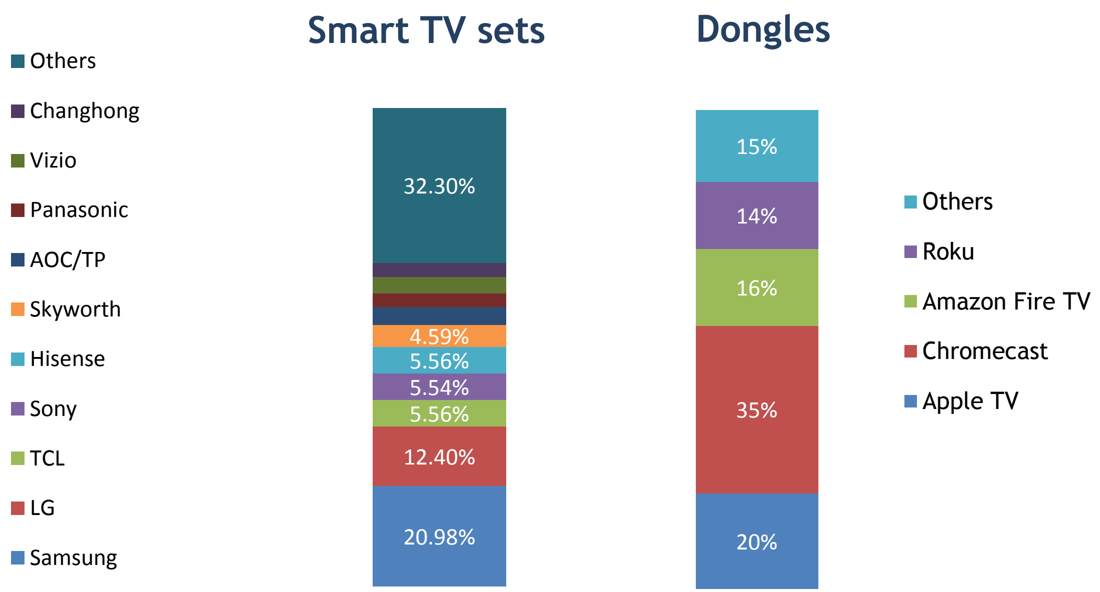
Consumer's appetite for mobile TV seems limited



- Technology is not the limiting factor any longer
- Demand for linear TV on mobiles is not distinct, it is subset of premium live content
- For this "spikey demand" LTE eMBMS seems a better solution

4. Regulatory changes

Eco-system access also important for connected TV sets

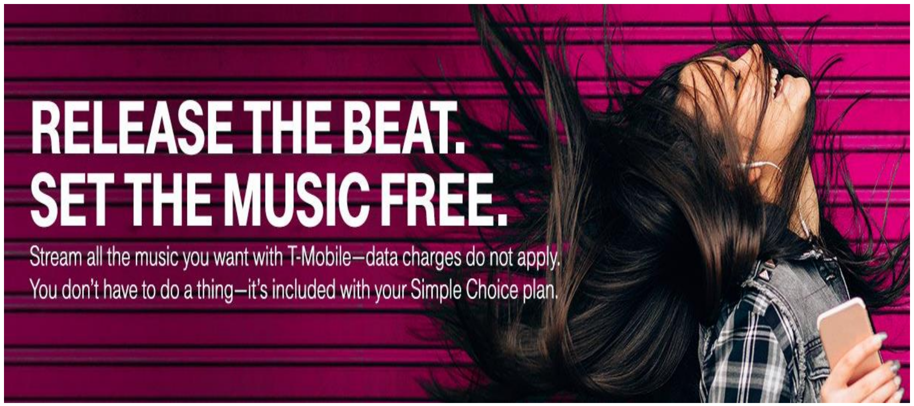


Source: Statista, Strategy Analytics, 2016

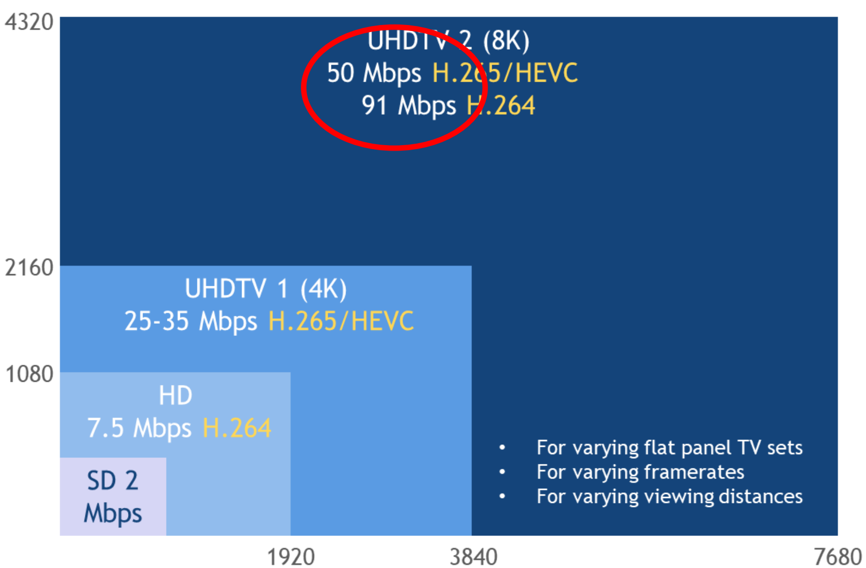
- Recent eco-system dispute:
  - Sep 2017: Google pulled YouTube access from Amazon's Echo Show (= smart speaker)
  - Dec 2017: Amazon not selling Google's Chromecast and Home products
- Securing access to TV apps can be critical, however:
  - Competition is fierce
  - Standardisation helps

4. Regulatory changes

Net neutrality for audio-visual services is challenging



Source: T-Mobile



Source: ITU

- AV zero-rating offerings are currently attracting regulatory attention:
  - Offerings can constitute a violation of net neutrality rules
  - Rulings in US and Europe vary
- The 2012 - KT/Samsung - dispute may repeat itself in the future:
  - Mature production of 4/8K content and services
  - Connected 4/8K TV sets will accelerate broadband demand

4. Regulatory changes

Local AV content requirements also for OTT

Source: European Council

- AV content requirements should be (as much as possible) technology-neutral
- Regulating non-linear services poses two challenges:
  - No natural capacity constraint
  - More viewer's control over content
- In EU regulatory cornerstone = AV Media Service Directive (AVMSD)
- AVMSD currently under review:
  - Includes now social media services
  - Advertising rules more relaxed (20% rule only between 07:00-23:00)
  - Relaxing of product placement & sponsoring rules (by self-regulation)
  - VOD SPs to provide at least 30% local content