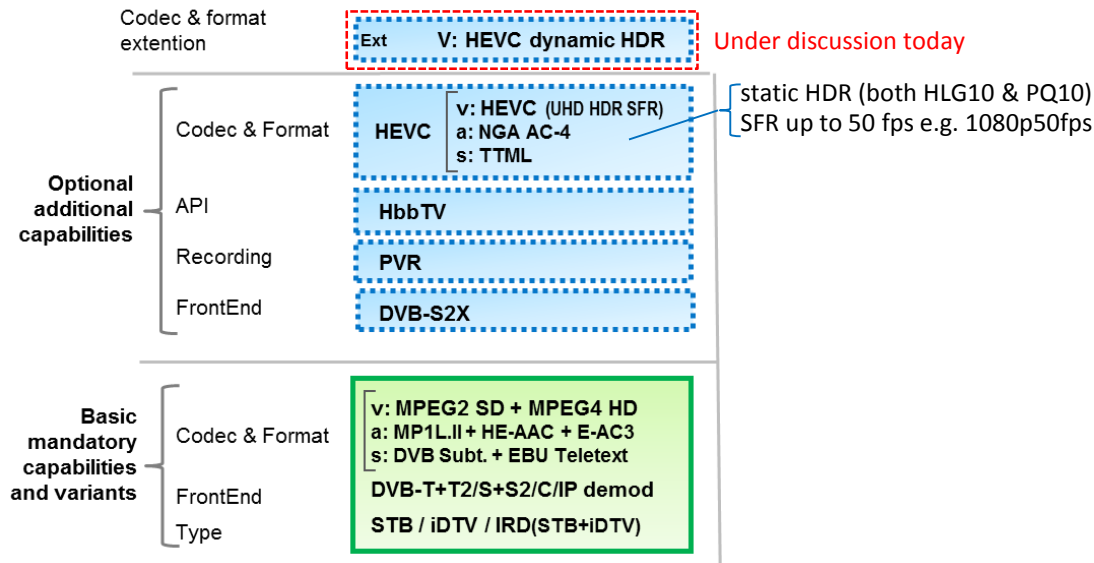
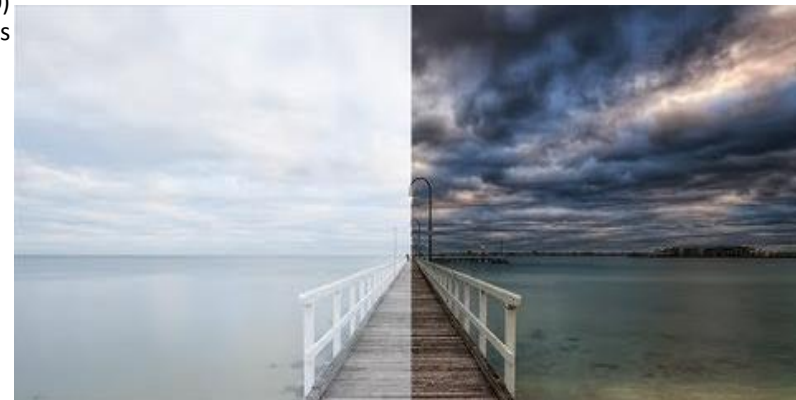


- Background: Dynamic metadata HighDynamicRange (dHDR) and HighFrameRate (HFR):
  - As earlier NorDig based upon DVB spec, only variants inside coming DVB specs is relevant here.
  - *Excom meeting March2019:*
    - *HFR: low interest right now to introduce -> postponed*
    - *dHDR: interest but Excom to investigate members concrete interest and demands,*
    - *dHDR: technical group study more, too early to start drafting, commercial requirement should be updated (old commercial requirements used for HEVC&NGA)*



## dHDR



## Dynamic metadata HDR (dHDR)

- DVB dHDR status: spec finalized, DVB/ETSI spec published, DVB prepare reference streams f dHDR
- (OTT) DASH dHDR status: under publication prel w 3 month ETSI spec
- DVB has included 3 dHDR technologies/formats, all HDR **PQ10** based:
  - Technicolor/Philips SL-HDR2 (ETSI TS 103 433-2, SMPTE ST 2094-20 Philips & 2094-30 Technicolor formats)
  - Samsung HDR10+ (SMPTE ST 2094-40)
  - Dolby Vision (ETSI TS 103 572, SMPTE ST 2094-10)

*(Note: all three dHDR candidates been present in NorDig-T/video subgroup meetings)*
- All 3 dHDR formats are backward compatible for static HDR/PQ10 IRDs to receive and display (up to broadcaster/colourist to ensure performance for static HDR HEVC IRDs).
- Work ongoing in ETSI (JTC broadcast group) led by Technicolor/Philips to add dynamic metadata with HLG (SL-HDR3). Dolby mention already support but not promoted (since DVB so far been for PQ).
- dHDR bandwidth
  - All formats has low extra capacity (in magnitude of 100kbps or less, could be as low as 10-15kbps per format)
  - supports of “simulcast” several dHDR metadata formats for one and the same video stream in (DVB requirement, so far not yet tested)
- Conversion possible from HLG to PQ dHDR within same format
- Conversion from one dHDR format to another, could harm “artistic intension” from colourist, content owner/broadcasters may not allow this, no “approved” method today -> “risk” that Broadcasters (often part of its content is external from different content owners) will broadcast different formats depending on content origin

## Dynamic metadata HDR (dHDR)

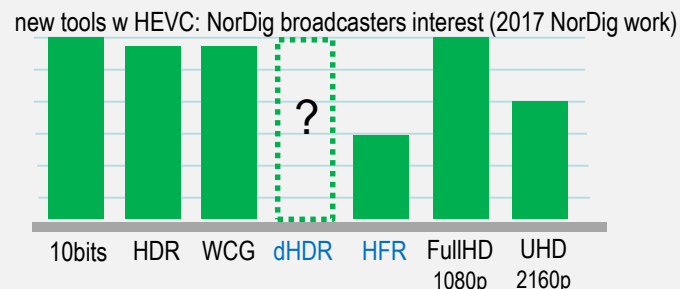
- NorDig-T/video group has not (yet) compared the 3 formats (pros&cons, relative efficiency, IPR costs...).
- Service plans in Europe dHDR
  - already used in some OTT/Online streaming services and available in some TV sets, even if it might not yet implemented as DVB signalling for dHDRs.
  - OTT: already on-air (including Netflix, Amazon, AppleTV+, Disney+)
  - Broadcast: no info, several considering, live broadcast trials been made in France, Spain, FIFA World Cup
  - PayTV: several operators (e.g. Orange, Canal+, SFR) for VOD/OTT
  - French DTT discuss to draft optional dHDR (all 3 formats) and IRD shall not be disturb by format not supported
  - (DTG no discussion/action/planning yet around broadcast HEVC nor dHDR)
  - (SVT tests HDR for OTT/SVT Play: "SVT Testbild" at SVT Play)

Note, we can not expect that current dHDR impl on TV sets will work for broadcast usage or DVB DASH streaming.

From NorDig 2017 work, HEVC

Figure: data from NorDig T/video HEVC study 2017 and questionnaire.

Note about FullHD, refers to as sub-resolution UHD BT2020



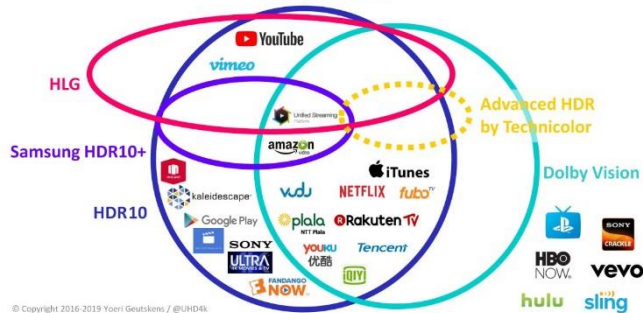
- Members view (broadcasters and operators)
  - SVT, DR & NRK:
    - dHDR, right now more interest than HFR and UHD,
    - dHDR could make big difference espec for drama production,
    - dHDR roll-out could for example be first via OTT streaming and later within broadcast,
    - dHDR too early today to select one of the formats,
    - dHDR could accept that this would be optional tool for IRD (initially), (but big interest among broadcasters for dHDR than NorDig should mandate dHDR w grace period)
    - HFR<sub>100fps</sub> could accept wait and revisit topic later, a bit challenging to produce right now
    - backward compatibility is of interest.
    - interesting TV format: 1080p50fps dHDR
    - SVT/Lars typical future production could be: drama 2160p25fps dHDR and sports/general 1080p100fps SDR/HDR.
  - DR:
    - Difficult for PSB to choose exclude viewers due to only select one dHDR tech
    - As DR understand it today: Static HDR not as big step for viewers to SDR compared to dHDR, (main interest is for 1080p50, than UHD and HFR/100fps)
  - Test streams: some interest to collect test streams
  - TDC: follow broadcasters, CD: some interest depends upon broadcasters
  - Preferebly if Nordic & Irish broadcasters could agree upon a common dHDR format (for production). Propose to make a study around dHDR to find a common dHDR among broadcasters.
  - If dHDR format, then the decision of which dHDR format should be done productions side and not on the IRD side

- Industry view
  - dHDR, most TV manufacture prefer dHDR is optional feature in NorDig.
  - dHDR, if NorDig would add dHDR (as mandatory), than most manufactures request only one dHDR format and not require all 3 formats, similar NGA
  - Samsung, TP Vision prefer markets decide themselves (i.e. not specified a single dHDR technology in NorDig, e.g. that NorDig add IRD not to be disturb by dHDR not supported)
  - dHDR already in some TV sets, already used for some services, smaller step than HFR
  - dHDR, manufactures asks for service plans/roll-out plans from broadcaster to consider this.
  - NorDig should collect from members/broadcasters and regular present/provide service plans and intensions to the Industry.
  - (Sony) With all improvement in video processing and display in new modern TV sets, reduces the diff betw sHDR and dHDR
  - DVB during IBC <https://www.ibt.org/tech-advances/dvb-unveils-new-specification-for-hdr-dynamic-mapping/4092.article>

- dHDR formats taken from <https://www.flatpanelshd.com/focus.php?subaction=showfull&id=1559638820>

## Video streaming services

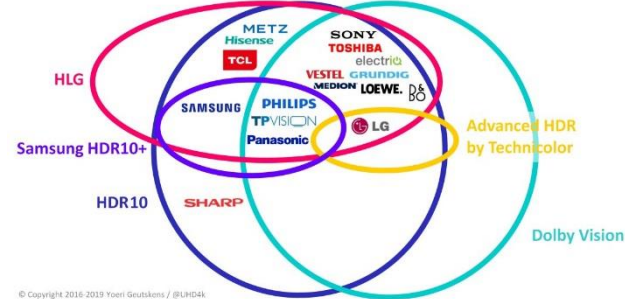
HDR ecosystem June 2019



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## TV makers / brands Europe

HDR ecosystem June 2019



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NorDig/Per T note:  
TV sets today in general do not impl all 3 formats (some impl two, some other one format)

## Movie studios' home entertainment divisions

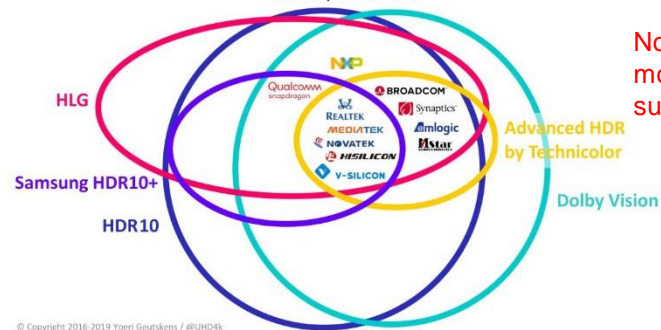
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## Chipset makers

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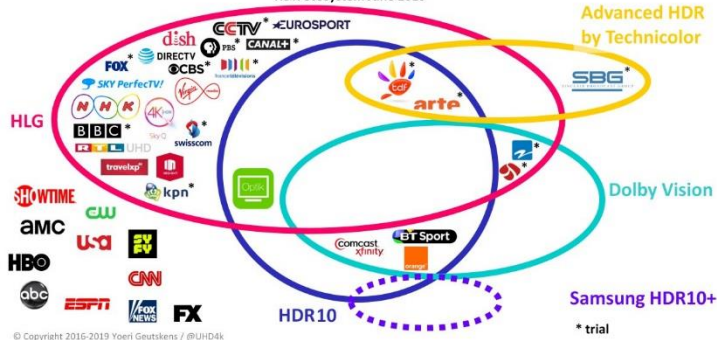


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NorDig/Per T note:  
most chipset seems to support all flavours

## Broadcasters / Operators

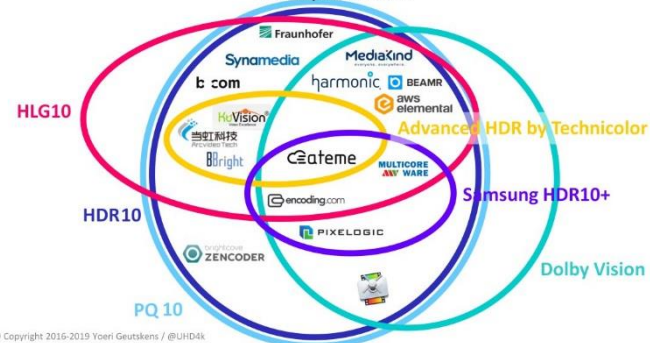
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## Encoding vendors

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## Summary mini-study and proposal NorDig HEVC extensions dynamic HDR:

- dHDR

- DVB has specified three formats [Technicolor/Philips SL-HDR2, Samsung HDR10+, Dolby Vision]
- no result of comparing, coming/already in several TV sets to some degree (not as DVB specified),
- Service plans in Europe: OTT several, broadcast: some considering and trials
- NorDig Broadcasters: high interest from broadcasters (for usage in some program events, like drama productions)
- Broadcasters might need to deliver (broadcast and OTT) different dHDR for different content (due to restriction from content owners etc), therefore complex for NorDig to select only one format
- NorDig specification today includes sHDR (HLG + PQ)
- NorDig work around dHDR:
  - NorDig Excom will collect from members/broadcasters service plans and intentions and (regularly) present it the Industry /NorDig T (planned to be presented at Excom meeting 10<sup>th</sup> Oct 2019)
  - **NorDig T/video group study more, report back in Oct 2019 (waiting Excom decision before start drafting)**
  - **If NorDig is interested in adding dHDR:**
    - **Technical evaluation among 3 candidates is expected to be TOO difficult to achieve with “correct” conclusions within NorDig (too many dependencies) in order to select ONE.**
    - **IF one format is to be selected, NorDig T would only be able to make a technical info gathering similar as NGA work (e.g. collect tech info, licenses etc) AND would be very difficult to come with a recommendation for a single dHDR AND would need to establish well defined criteria before**
    - **Alternative for selecting ONE system could be to:**
      - **dHDR optional, where used dHDR signaling shall be as DVB specified and that IRD shall not be disturbed by formats not supported or**
      - **Not mention/recommend dHDR, BUT incl that IRD shall not be disturb by formats not supported**

## Excom:

- At present time Public Service Broadcasters has no concrete plans and low interest for dHDR
- Excom decision to not mandate dHDR
- Excom decide to add into next NorDig IRD spec if dHDR is used then signaling shall be as DVB specified and IRDs shall not be disturbed by formats not supported. AP for NorDig T to prepare proposal, (however this item is not seen as important to trigger any immediate release of new spec, instead item to be incl whenever next release is released)

## NorDig Unified IRD spec future – “v3.2” proposals:

- General
  - Bug list - a few number of listed items,
- Video:
  - Dynamic metadata HDR low interest at present time and is postponed, only to be added is if used then according to DVB and IRD shall not be disturbed
- CA/CP/Security
  - CommonInterface v2 (USB), still monitoring status, Vestel reports that Turkey plans for using CI+v2/USB. Excom: **AP Per T/NorDig T** to check with PayTV operator members' interest & plans.
- Audio – none
- Subtitling – none
- HbbTV - none
- FrontEnd – none
- SSU - none
- PSI/SI, menus etc...
- Others?