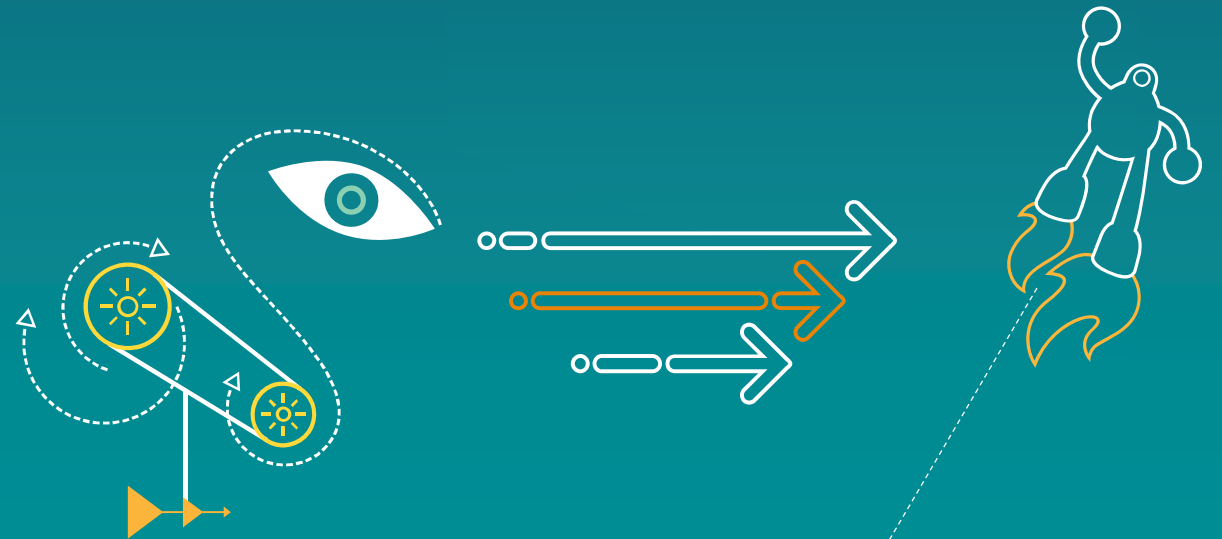


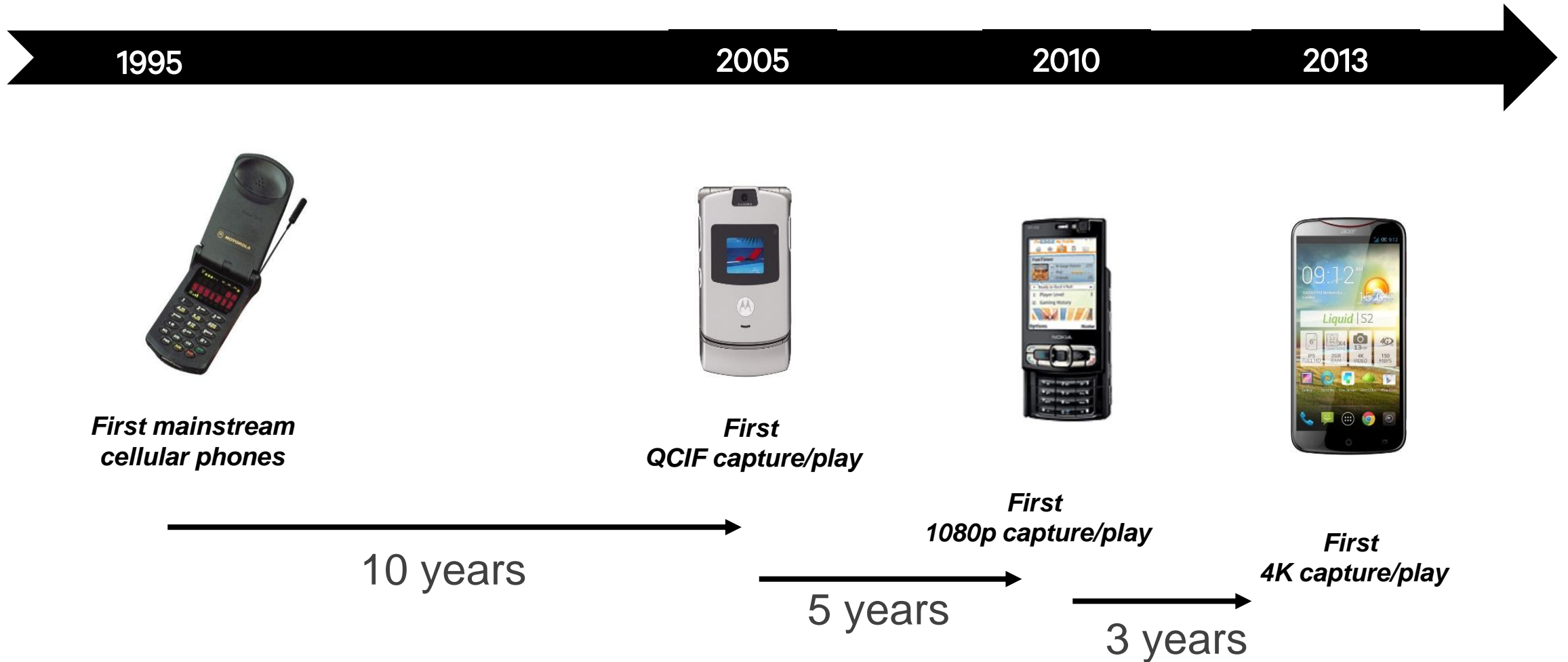
Qualcomm Technologies Inc.

Next frontier for Mobile Video



Qualcomm Proprietary and Confidential

Mobile video timeline



Digital video evolution is faster on mobile

Mobile as a video platform



- Largest consumer platform for **4K play/capture**
- Largest platform supporting next gen compression formats i.e. **HEVC**
- Most importantly biggest driving force for **brand new video experiences**



Wireless display



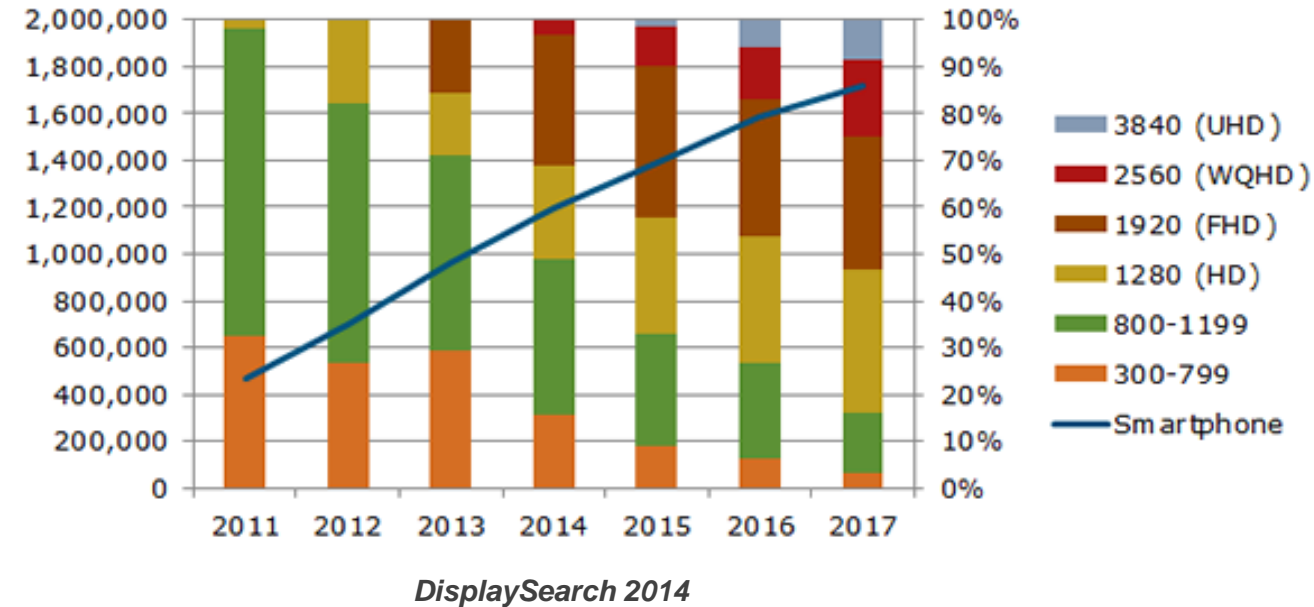
Live broadcast



Virtual reality

Display improvements influencing mobile video

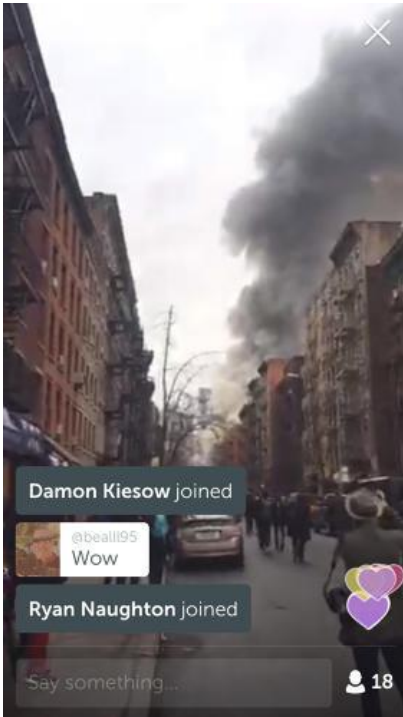
- Average display size grew 38% YOY in last 4 years
- Pixel density also increased over years
 - Galaxy S3 – 306 PPI
 - Galaxy S4 – 441 PPI
 - Galaxy S6 – 577 PPI
- HD/FHD panels contributes as biggest volume however WQHD becoming common on high end units
- 4K panel is forecasted for near future



Video pushed to mobile device trails display characteristics

Average of video segments shifted from 360p towards 480p/720p range with max resolution available at 1440p per display

New use case - Live broadcast i.e. Periscope



Observations

- Over 10M active accounts
- Over 1.8M active users
- H.264 Main Profile L5.2
- 320x568 @ 30fps, 1-1.5 Mbps
- All I-Frame
- CAVLC for entropy coding
- Frame based rate control
- End to end latency under <0.8sec under good conditions
- Typical delay is 2-3seconds

How 5G can improve the experience

Higher network throughput

- High resolution stream to match display

Lower latency

- Reduce time offset between end users (important as viewers comment on watched scene)

New use case - Live VR video



Observations

- Current gen devices and VR video is limited for delivering a true immersive experience
 - 300 PPI @ 60Hz → 1000 PPI @ 120Hz
- Requires high pixel throughput (>2160p60) due to effective resolution being lower with small FOV
- Additional challenges (delays and artifacts) for stitching multiple camera input, warping on source and de-warping, post-processing on the client device

How 5G can improve the experience

1. Higher network throughput
 - ❑ Higher resolution 360 video (2160p60 -120) to increase effective resolution

Thank you

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