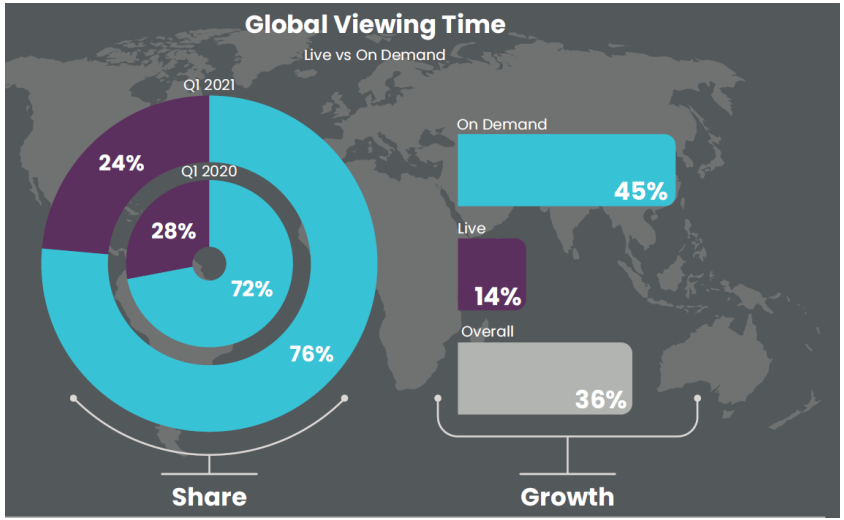
CONTENT DELIVERY
Strategic View

CTO Area

EMERGING IP TRENDS

A LONG LASTING FIGHT BETWEEN LIVE AND VOD

In spite of the pandemic crisis, the consumption of linear TV has been shrinking, with an increase in VOD consumption for movies, tv series, documentaries.



Source: Conviva_state_of_streaming_Q1_2021

Anyway, the scenario is still foggy:

For example, Bob Chapek, CEO at The Walt Disney Company, has recently announced that the company will shut down 100 of its linear TV channels on a global scale during the rest of 2021.

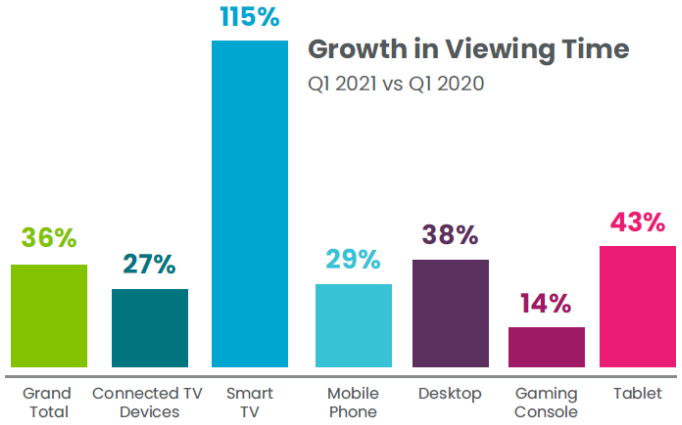
At the same time, linear sport events are moving from broadcast to IP due to the cord-cutting effect (e.g. DAZN).

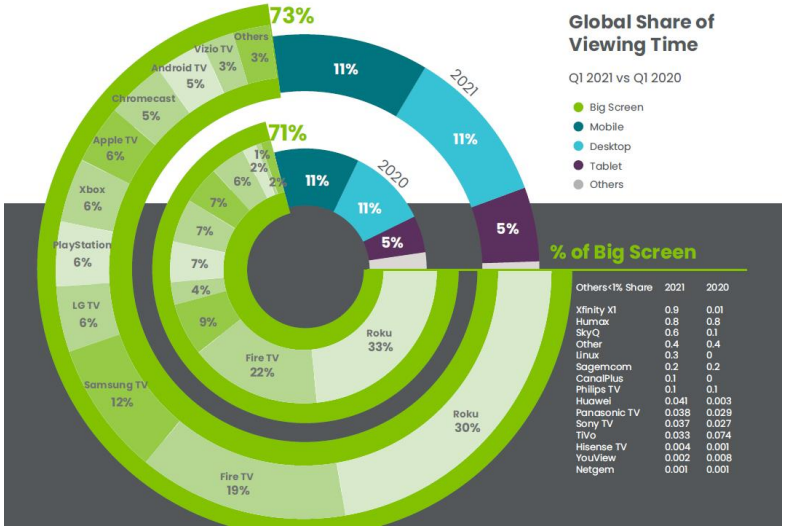
This **uncertainty** must be taken into account when designing the future proof content delivery networks.

The balance between Live an VOD will be a key factor in shaping the strategy.

BIG SCREENS ARE HERE TO STAY

Smart TVs engaged viewers with the biggest expansion of time spent over Q1 of last year with a 115% increase, also in consideration of the pandemic crisis; due to the extreme fragmentation of the technological scenario, a traditional broadcaster must make its own contents available in every platform and ecosystem in order to compete with global OTTs.





Source: Conviva_state_of_streaming_Q1_2021

(EXTREMELY) SHORT CONTENTS

Smartphones are particularly suitable for short form contents consumption: **the Maneskin's IG And Tik Tok Stories went viral at the last Eurovision**. Hence new genres are emerging to meet this users' need. For example:

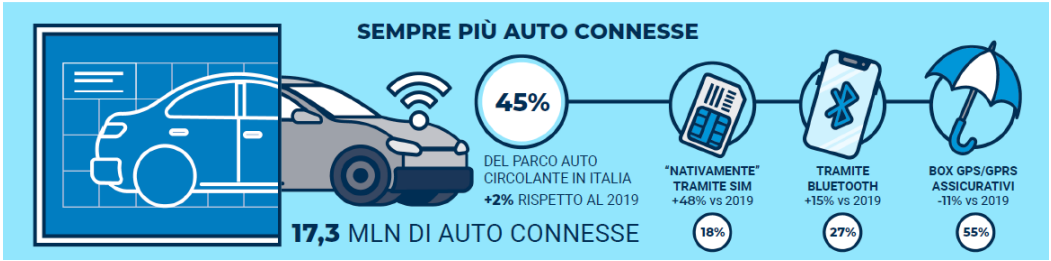
The vertical dramas are a brand new genre, not a mere adaptation of long form contents to be watched on smartphones:

- ✓ They are written and designed for mobile only
- ✓ They are shot vertically (9:16)
- ✓ Average duration of a single episode ranges from 1 to 4 minutes
- ✓ The average number of episode for season ranges from 10 to 30.
- ✓ Romcom situations mostly
- ✓ Typical manga techniques (e.g. split screen)
- ✓ Tencent recently invested 1 billion yuan to produce new "Originals", also leveraging the roll out of 5G networks

The consumption of short form contents results in an increasing pressure especially over Mobile networks: a serious issue for future content delivery networks to deal with. Global mobile data traffic exceeded 49 billion gigabytes/49 exabytes per month at the end of 2020 and is projected to grow to reach 237 EB per month in 2026 (Ericsson Mobility Report 2021)

EMERGING IP TRENDS

CONNECTED CARS



Source: Connected car and mobility-POLIMI School of Management, Osservatori.net

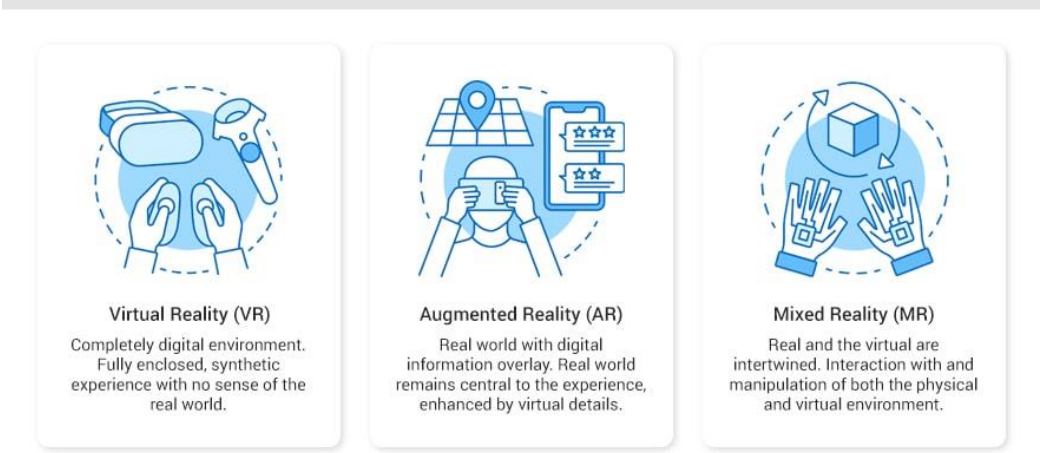
- ✓ In 2020 there were 17,3 mln connected cars in Italy (+2% vs 2019)
- ✓ 27% overall connected via Bluetooth (+15% vs 2019)
- ✓ 18% overall natively connected via SIM (48% vs 2019)
- ✓ A connected car will average a traffic of 25GB/day (vs 25GB per month of a smartphone)

SHORT-MID TERM. A connected car offers traditional broadcasters the chance to deliver ad hoc contents related to mobility: traffic update, wheater forecast, flash news, kid taylored contents, podcasts.

LONG TERM: once autonomous driving will be reality, who knows what's going to happen…

EMERGING IP TRENDS

VR/AR/MR



*Source :IdTechEx Augmented, Mixed and Virtual Reality 2020-2030: Forecasts, Markets and Technologies,2021"

	RES	TH (Mbps)	Latency (ms)
Entry level VR	**SD**	**100**	**2**
Extreme VR	**4K**	**1000**	**0,2**

Virtual, Augmented and Mixed and reality might offer the content providers the possibility to **design innovative** educational and entertainment formats

The augmented, virtual, and mixed reality market to be over $30Bn.*

GAMING PRESSURE

Gaming is putting an incresingly strong pressure on both fixed and mobile networks, demanding for specific features:

7h7'

- **average weekly time spent in 2017 on video games by regular or occasional users in the United States (+ 19% vs 2016)**

2,5 Billion

- **Users of video games in the world in 2017**

7 EB/mont

- **Global gaming traffic per month, up from 1 EB in 2017. CAGR 2017-22: 59%**

- ✓ High stability and resilience
- ✓ Audiovisual high quality
- ✓ **(Almost) Zero Latency**

This resulting in a close competition between streaming providers and gaming services in the usage of the delivery networks

FUTURE PROOF CDNs

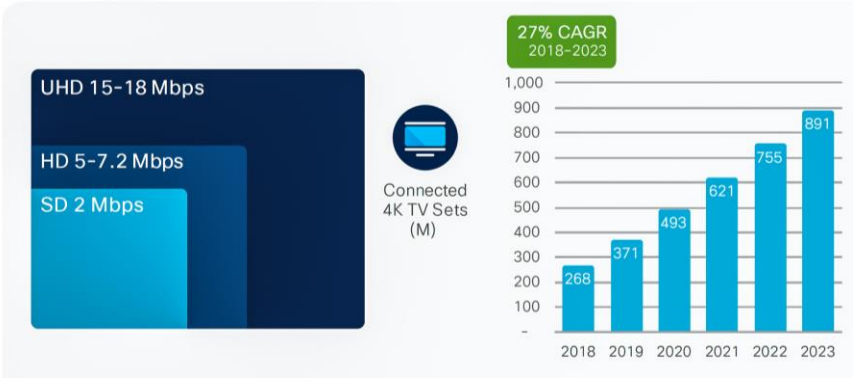
THE REQUIREMENTS

On the ground of the Emerging IP Trends, some of the requirements for a future proof CDN are listed below:

	ABR	Throughput*	Ultra low latency	Busy hour peak mgmt	Cybersecurity
Live streaming (Fixed)	●●●	●●	●●	●●●	●●●
VOD streaming (Fixed)	●●●	●●	●	●●	●●●
Mobile connectivity	●●	●	●	●●	●●●
Connected cars	●●	●●●	●●●	●●	●●●
VR/AR/MR	●●●	●●●	●●●	●●●	●●●
Gaming	●●	●●●	●●●	●●●	●●●

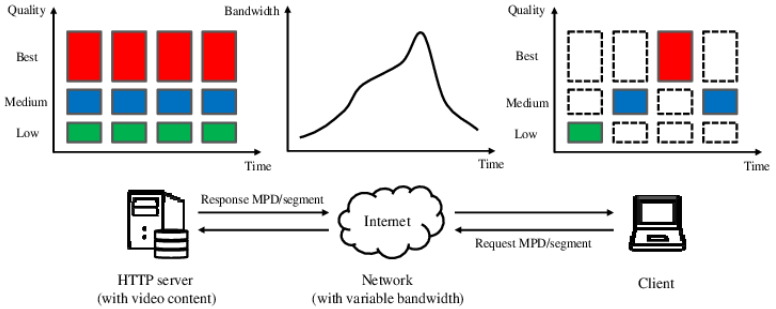
*bit rate: speed of the communication channel; (app) throughput: speed of the application

THE ROAD TO UHD AND BEYOND



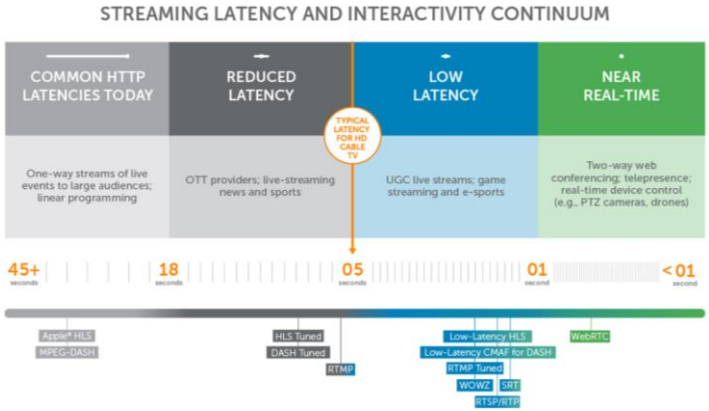
Quality Race: High quality is a key success factor: it leads to a remarkable increase in the customers' engagement→ **higher throughput required**

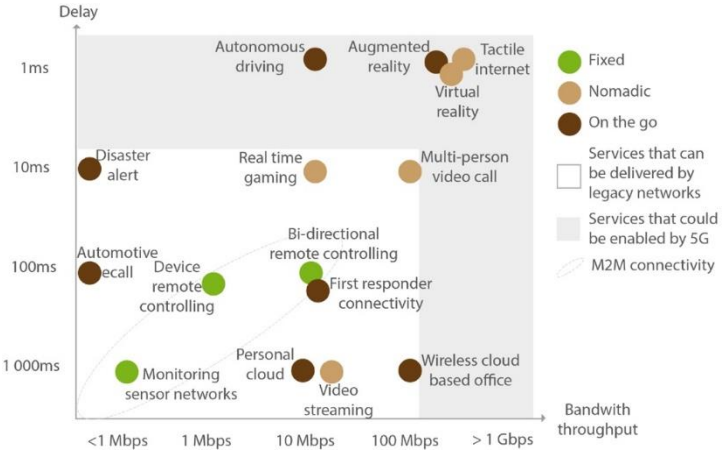
ABR: Contents must be permitted to range from SD to 8K and beyond (e.g AR/VR/MR) in a semless way also within the same session (when unpredictable jitter of the throughput may lead to a poor User Experience).



ULTRA LOW LATENCY

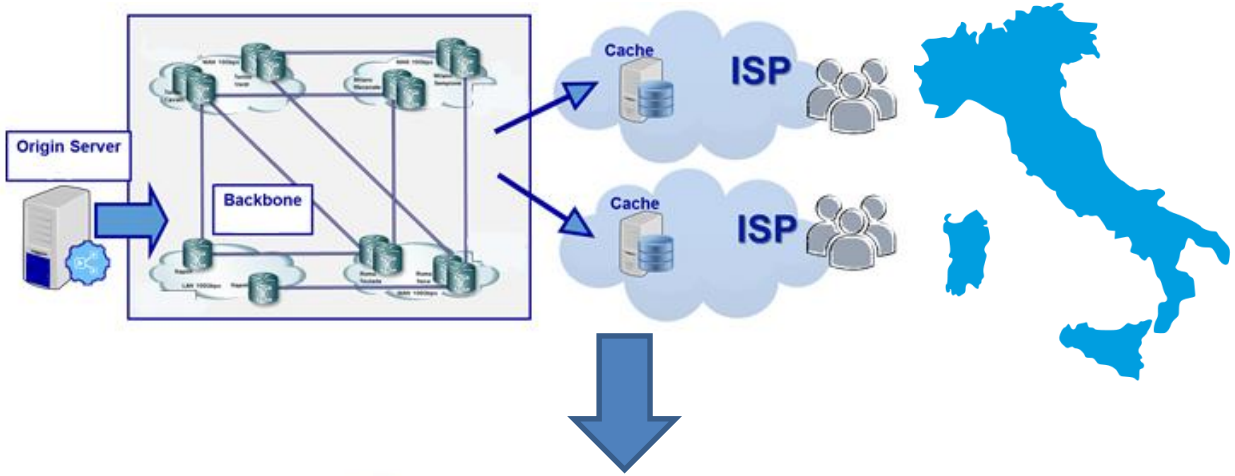
When it comes to Ultra Low Latency, the media industry usually refers to Video streaming, but-as contents will be delivered in different ways and on innovative platforms- an overall view of the scenario needs to be taken into account.



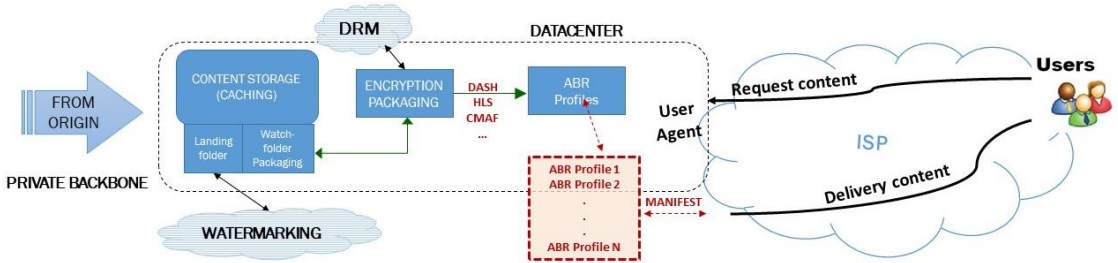


Low latency video protocols requires a higher throughput due to the reduced dimension of the chunks in the segmentation; **other applications, especially AR/VR/MR, need also a far shorter delay in response, whose effects could be beneficial for applications other than media (e.g. autonomous driving, gaming).**

EDGE CLOUD COMPUTING

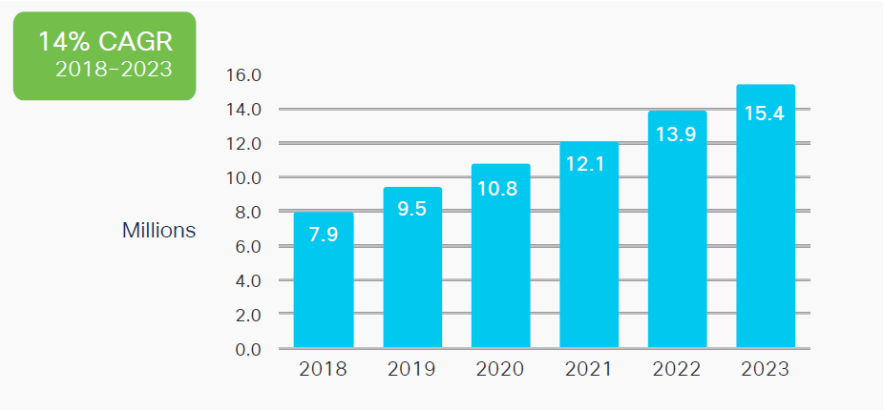


- ✓ Direct connection between data centers and origin server via a private and redundant backbone.
- ✓ **Computing functions in the peripherical nodes**
- ✓ Distributing data centers as near as possibile to the final users
- ✓ As tight as possible integration within Telcos infrastructure



→ **Higher flexibility and resilience when dealing with the peaks (Busy hour traffic)**
→ **Higher Throughput**
→ **Lower Latency**

CYBERSECURITY



- ✓ **Business resistance and resilience**: average DDoS attacks, whose average size is 1 Gbps - enough to take most organizations completely offline – are the most relevant threat to the business continuity.

- ✓ **Data breach prevention**: average total cost of data breach is $3.86M and average time to identify and contain the breach itself is 280 days (Source: IBM Security, cost of a Data Breach Report, 2020)

SO WHAT…?

- ✓ The conception of contents and the technical evolution of the platforms and of the networks influence each other.
- ✓ Big screens are mostly suited for long forms, whereas small screen for short forms: both will put a higher and higher pressure on IP networks. Quality race as a key factor for users' engagement.
- ✓ A further stress on IP infrastructure will come from services which might either complete the BC's offers (e.g. Connected cars connectivity, AR/VR/MR services) or compete with traditional content providers (e.g. gaming platforms). Ultra low latency as a 'must have'.
- ✓ Increasing demand for stability of the infrastructures, and focus on cybersecurity.
- ✓ Need to distribute the computing functions across the network in order to improve both performances and resilience of the infrastructure.