





Customizing Video Content Delivery: a Service Provider's Perspective

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9 territories, Pay TV offer evolving to full IP, OTT Internet TV

 **SPAIN**

Pay TV  

Internet TV 

 **UK***

Pay TV 

Internet TV 


 **GERMANY**



Internet TV 


 **BRAZIL**

Pay TV 

Internet TV 

 **PERU**

Pay TV  

Internet TV 

 **CHILE**


Pay TV  


Internet TV 

 **ARGENTINA**

Pay TV 


Internet TV 

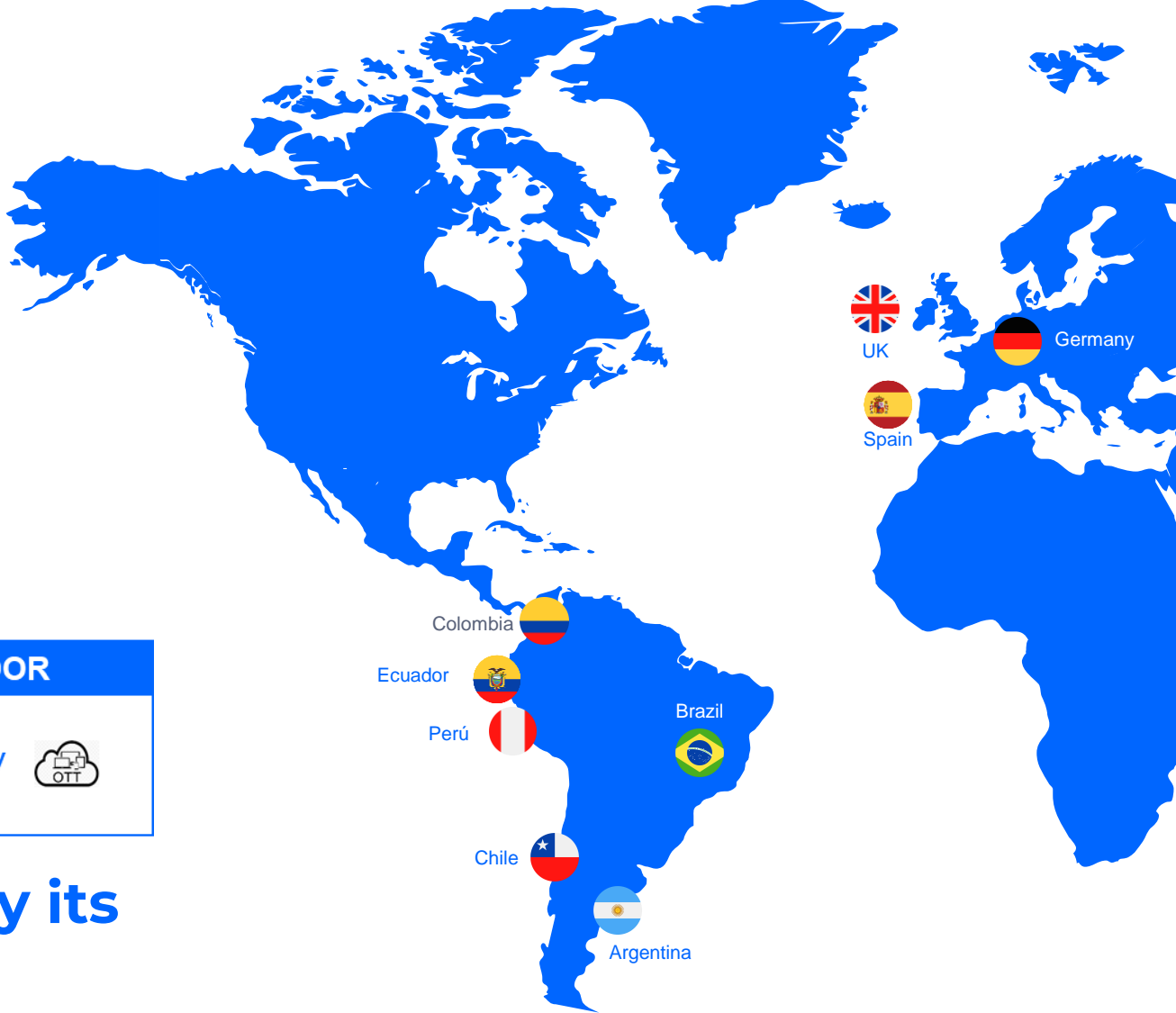
 **COLOMBIA**

Pay TV  

Internet TV 

 **ECUADOR**

Internet TV 



Telefonica video traffic served by its own CDN (TCDN)

*UK: Virgin Media O2 as a joint venture between Telefonica and Liberty Global

Congestion Control and QoE

- Telefonica is continuously improving video QoE for its own CDN (both for Telefonica's own TV services and for 3rd party video partners).
- Experimentation with new congestion-control algorithms is one effort in this direction.
- Video traffic, even from a single server, encounters highly diverse network conditions, calling for highly capable congestion control.

The limitations of one-size-fits-all CC

- Congestion control **logic** is traditionally oblivious to both
 - the service-specific QoE requirements
 - the prevailing network conditions wrt different users
- Congestion control algorithms are expected to perform well across a daunting breadth of application domains and networks.
- No universal CC logic can optimize performance across all networks and performance metrics.

Illustration: BBR vs. Cubic in the Wild

REGION	NETWORK TYPE	(%) BBR AVERAGE CONNECTION THROUGHPUT BENEFIT
Country 1 (Europe)	Fixed	-36%
Country 1 (Europe)	Mobile	+15%
Country 2 (LA)	Fixed	-17%
Country 2 (LA)	Mobile	-7%
Country 3 (LA)	Fixed	-18%
Country 3 (LA)	Mobile	-33%

The Compira Labs solution

CompiraEdge

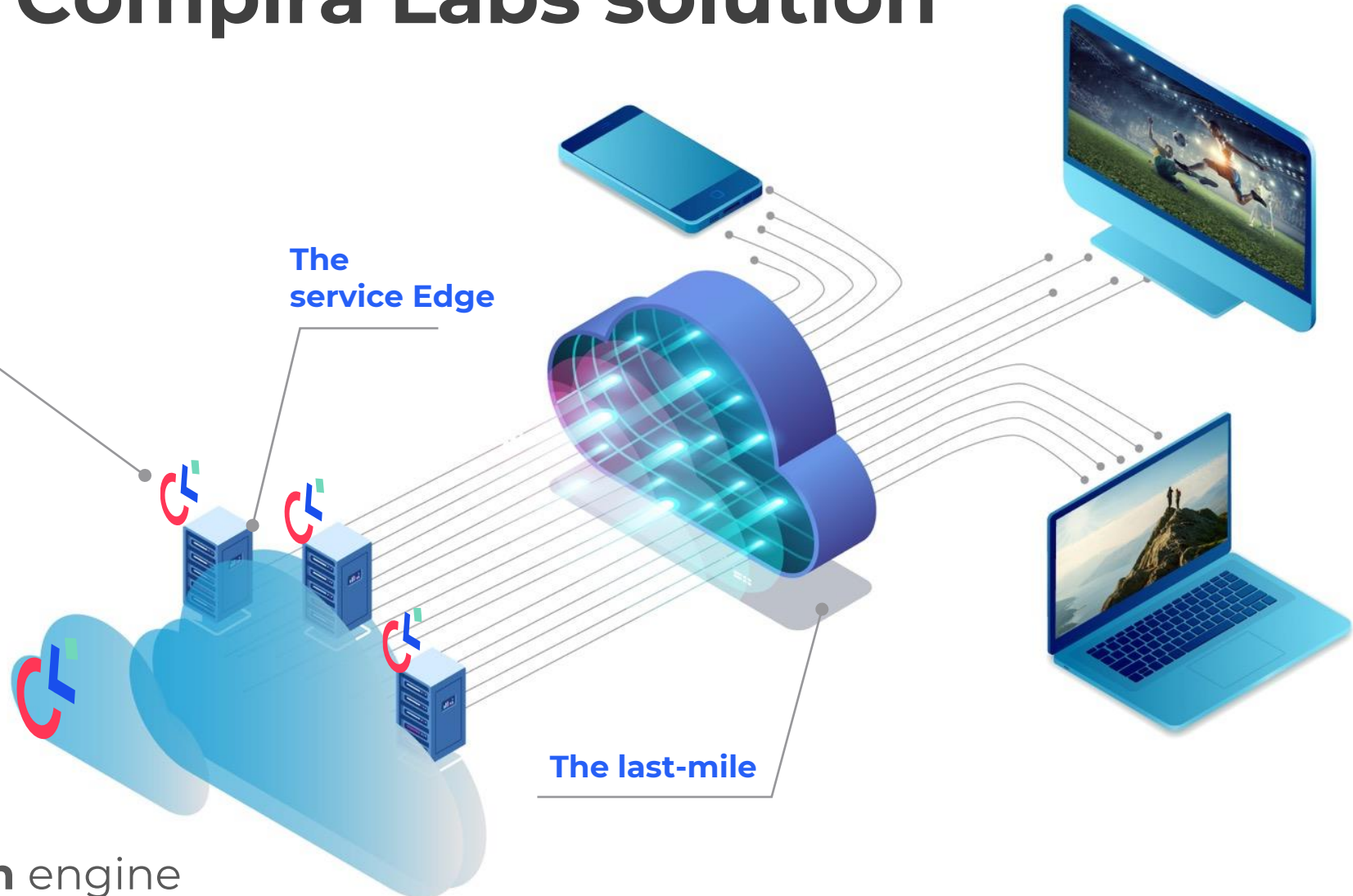
Real-time **rate optimization** via **online-learning**

The service Edge

CompiraCloud

Centralized, **ML-powered customization** engine

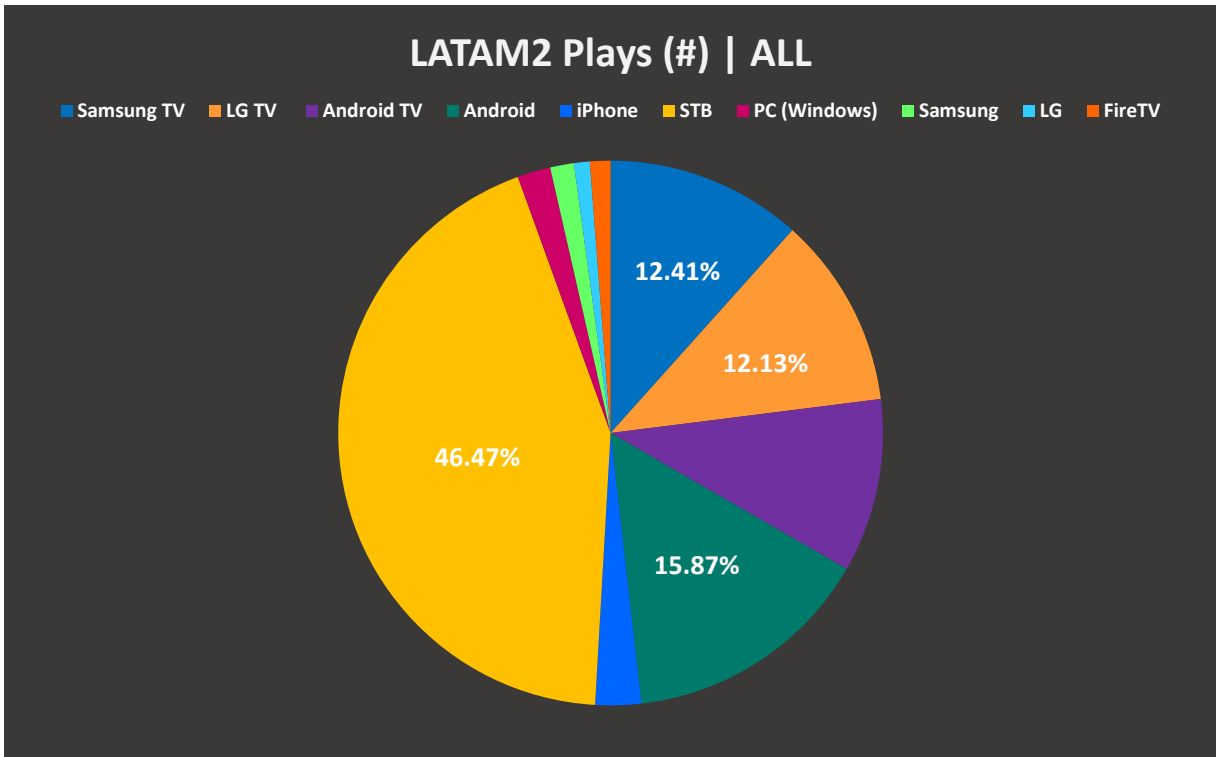
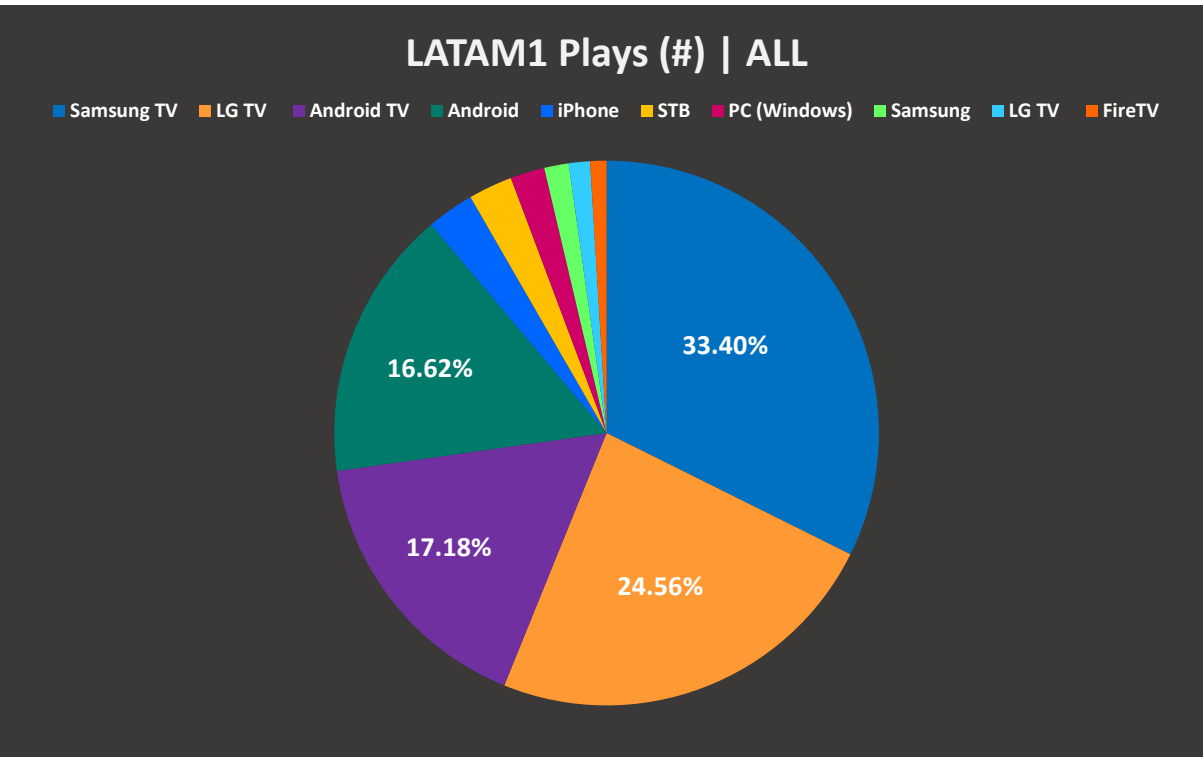
The last-mile



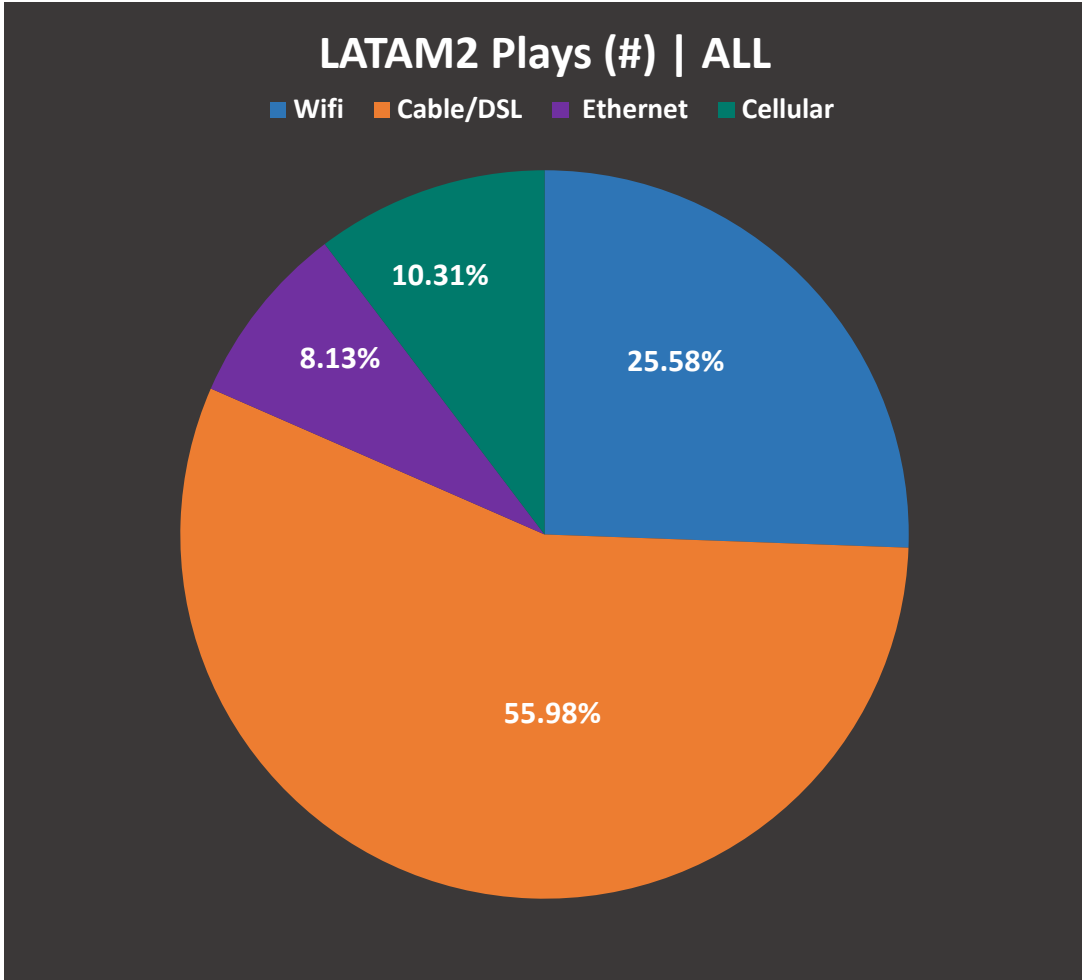
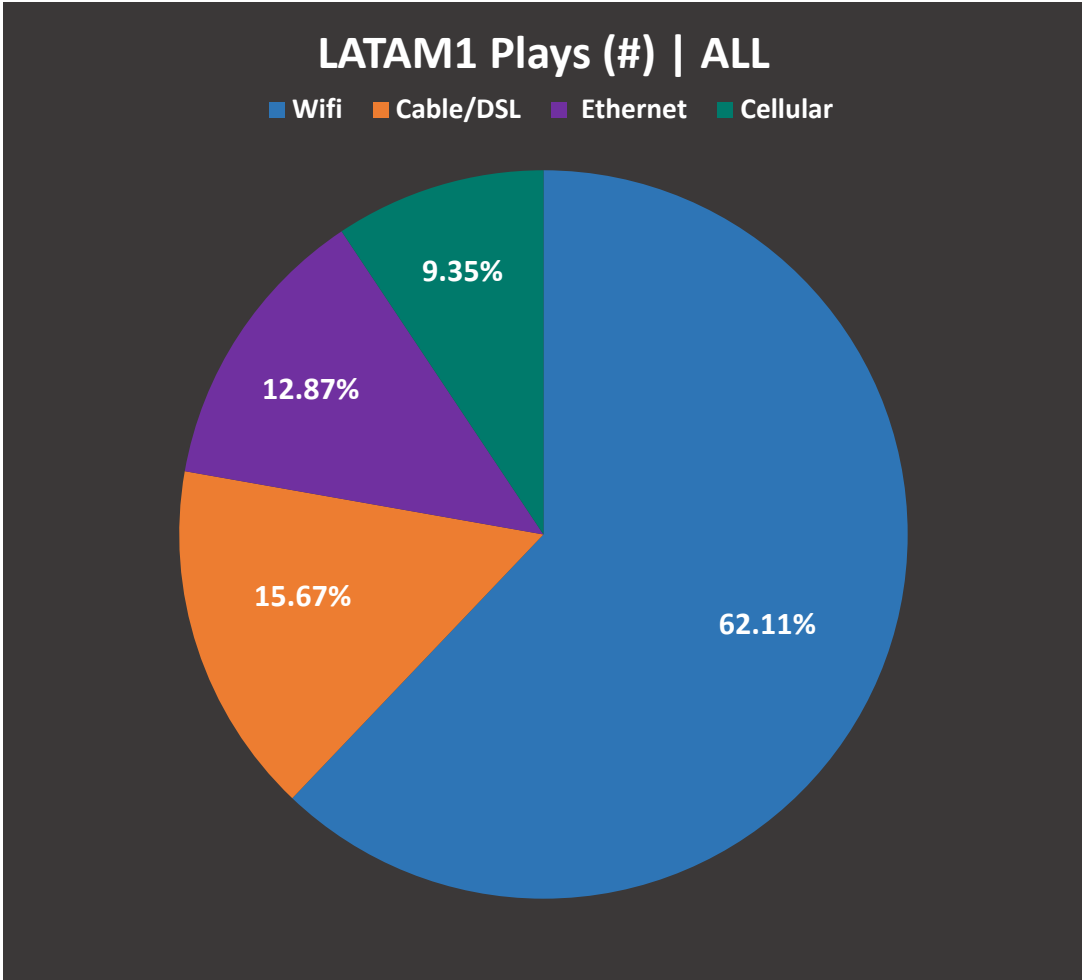
The field pilot

- 2 countries with very different networks
 - LATAM1
 - LATAM2
- Methodology
 - A/B testing within PoPs
- Data collection
 - Layer 4 statistics – Throughput, Packet loss, Latency
 - CDN logs - Request time and average request size
 - Player stats - buffering ratio, bitrate

Device type distribution

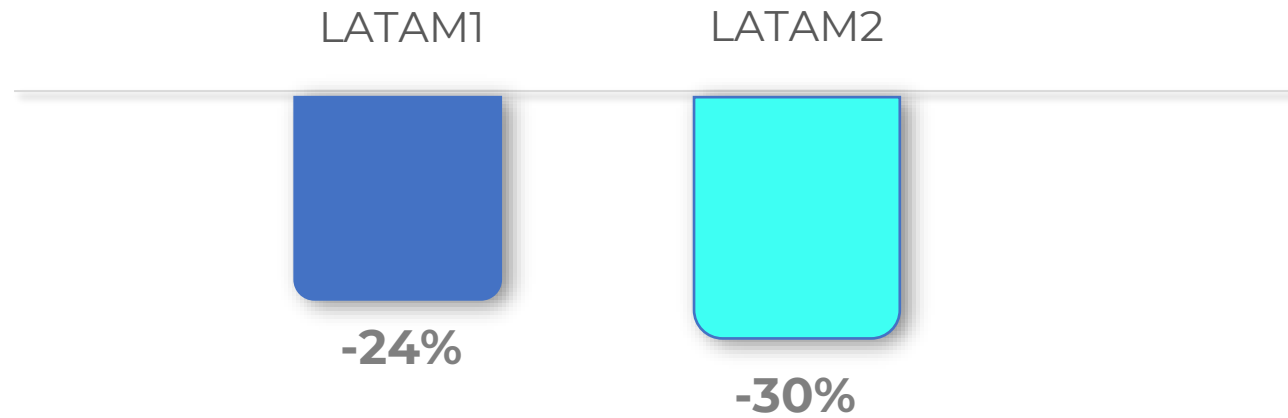


Access type distribution



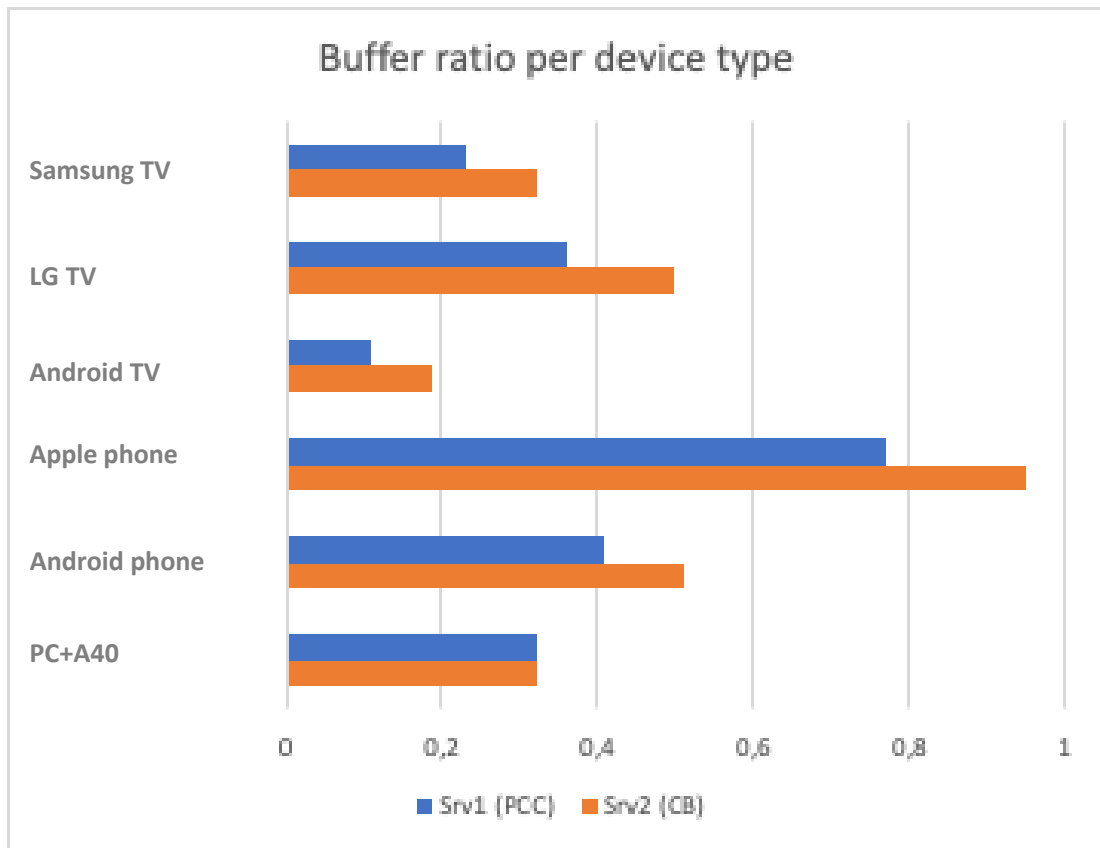
Pilot results – total rebuffering

REDUCTION IN REBUFFERING RATIO

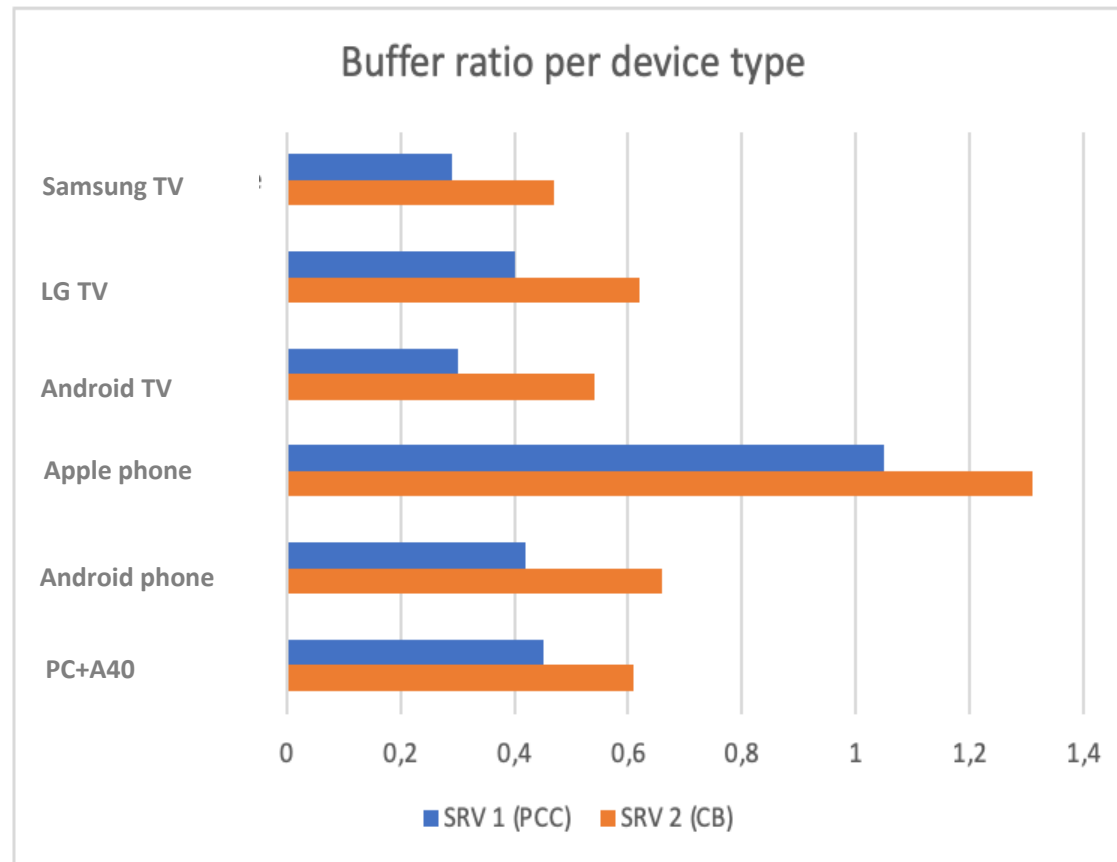


Results – buffering ratio

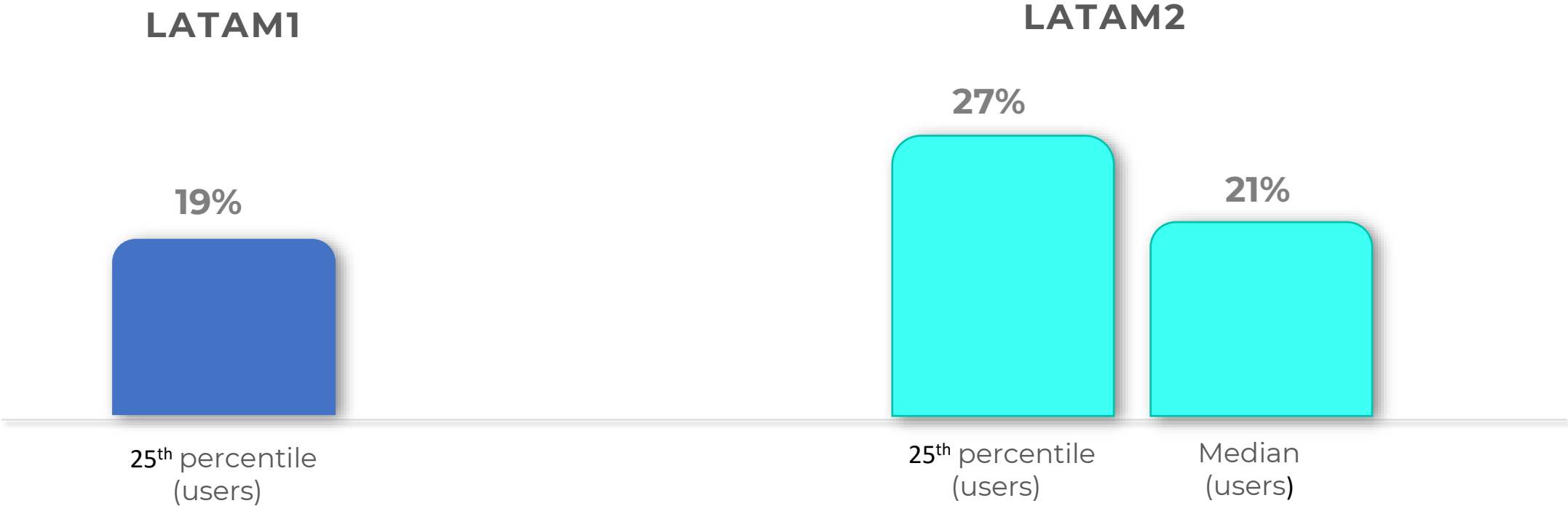
LATAM1



LATAM2



Results – video bitrate improvement



Conclusion and Next Steps

- CC has relevant impact on video QoE.
- Different geographical regions / user environments pose different challenges for CC
- Customizing CC to video QoE metrics and to different network conditions is key to better QoE
- Extending this approach to additional use-cases and regions is a promising direction.

Thanks!

