



QUANDO TUDO DÁ ERRADO

O CASE DO OUTAGE NA TRANSMISSÃO DA COPA 2018

TDC SP • JULHO • 2019



1º site no mundo a transmitir todos dos jogos na Internet

FIFA WORLD CUP




FIFA

2010



Primeira transmissão da Copa em

HD DEFINITION

Multicâmera 

-  ▶ Câmera principal
-  2 Close
-  3 Câmera tática
-  4 Atrás do gol - dir.
-  5 Ângulo inverso - esq.
-  6 Lado do campo



FIFA

2014

Experiência

MULTI CAM



2006



2010



2014



44K

285K

490K

USUÁRIOS
SIMULTÂNEOS

7.8

96

580

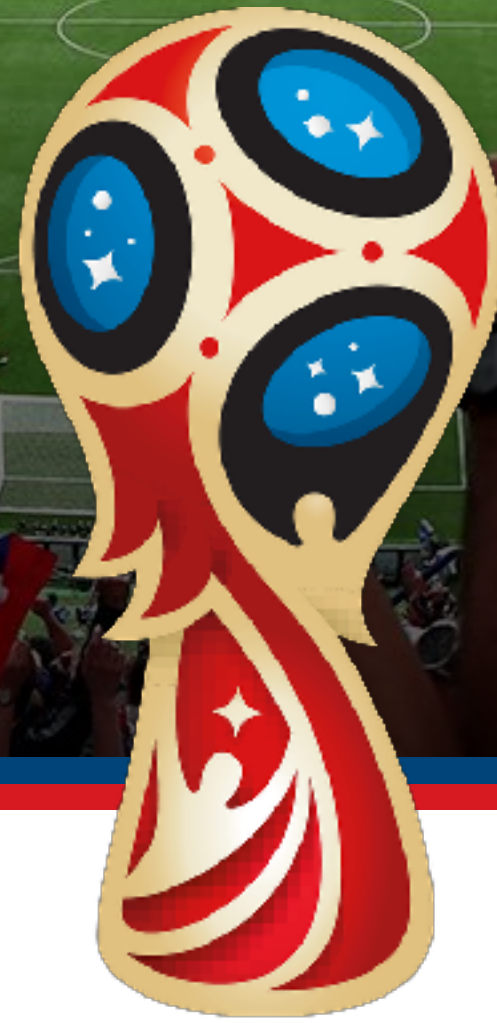
GBPS

420

800

1500

KBPS



FIFA WORLD CUP 2018

1.3M

usuários simultâneos

2Tbps

traffic

700K

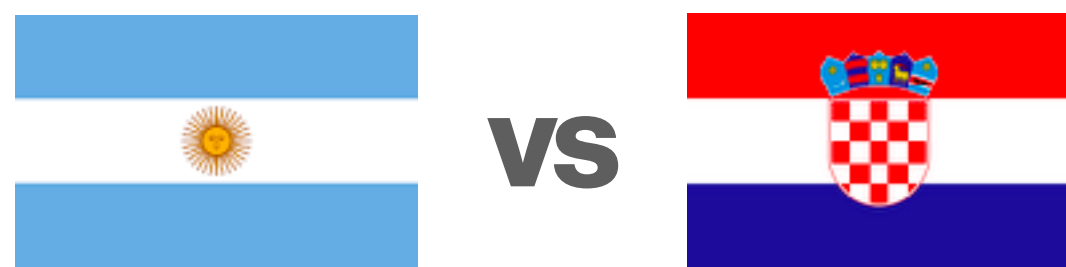
requests / sec



Copa do Mundo em 4K na Internet

Primeira transmissão 4K de todos os jogos da Copa

SAMSUNG.COM.BR/4KDEVERDADE/SPORTV



audiência
usuários simultâneos

14:00

14:40

15:20

16:00

16:40

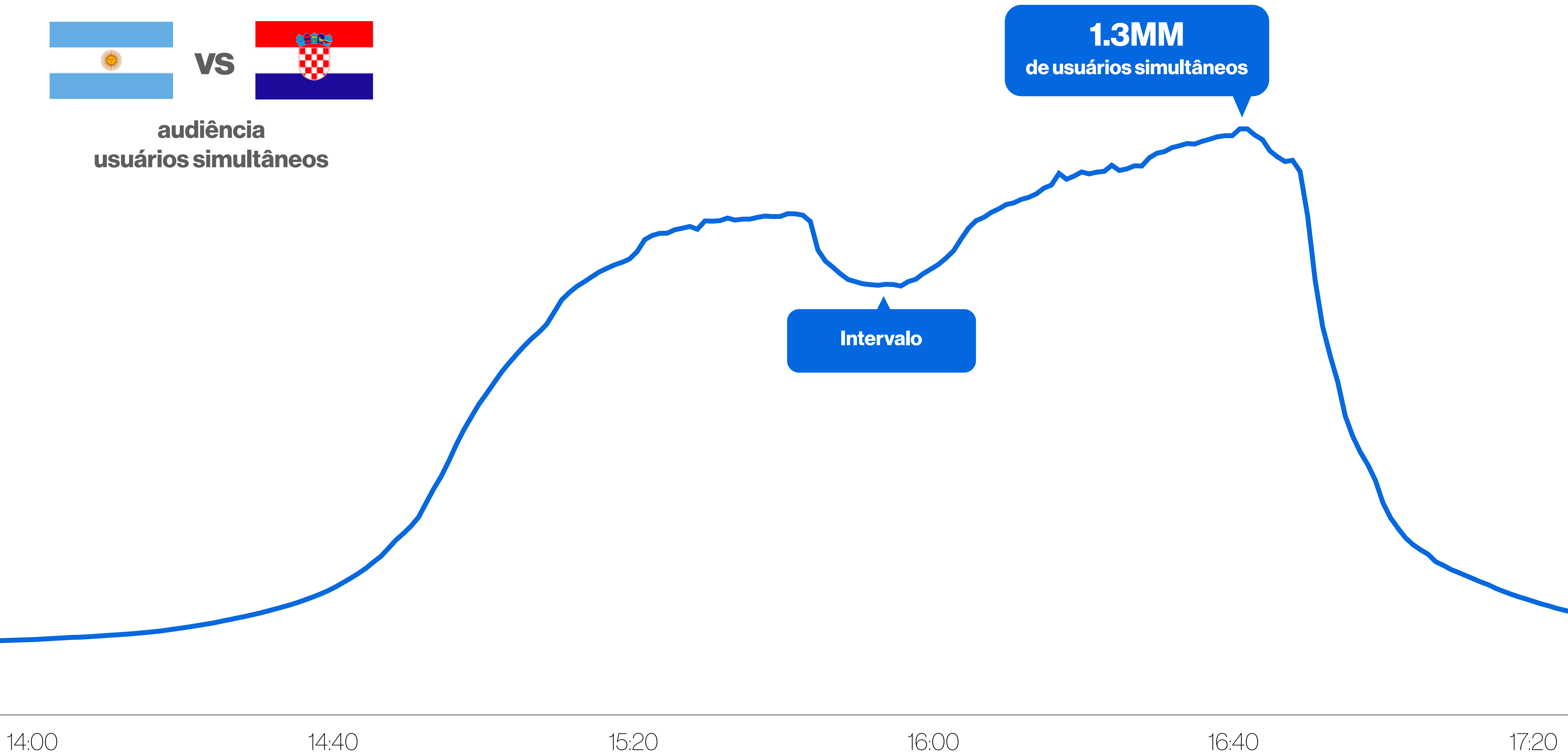
17:20



VS

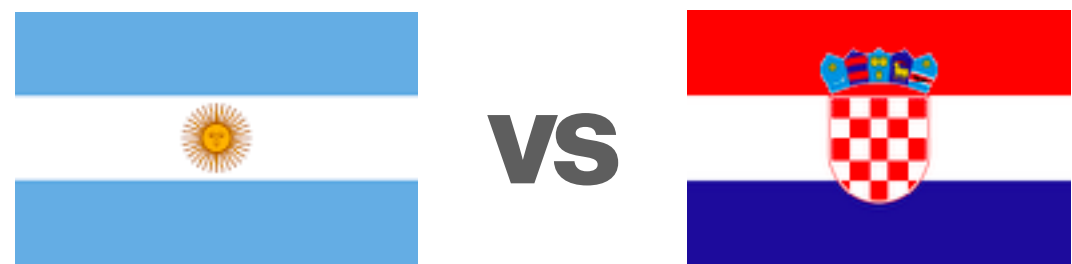


**audiência
usuários simultâneos**

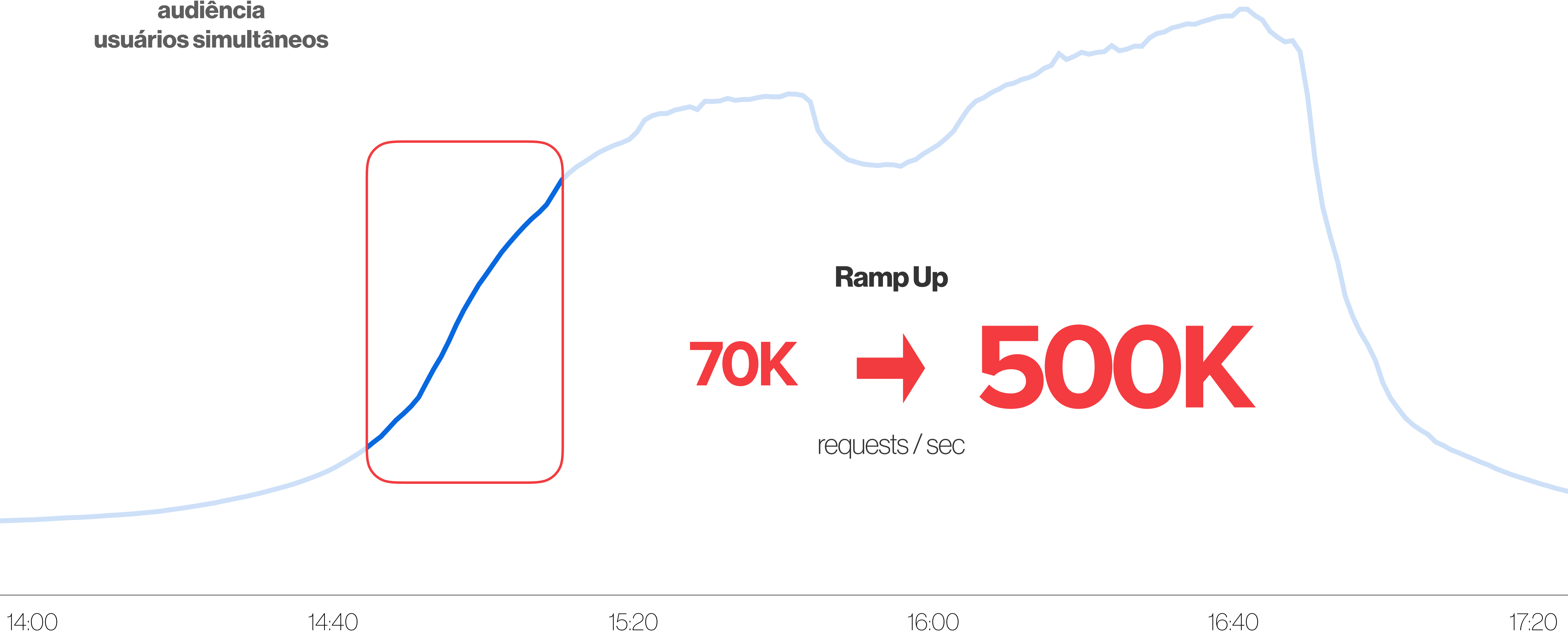


1.3MM
de usuários simultâneos

Intervalo



audiência
usuários simultâneos

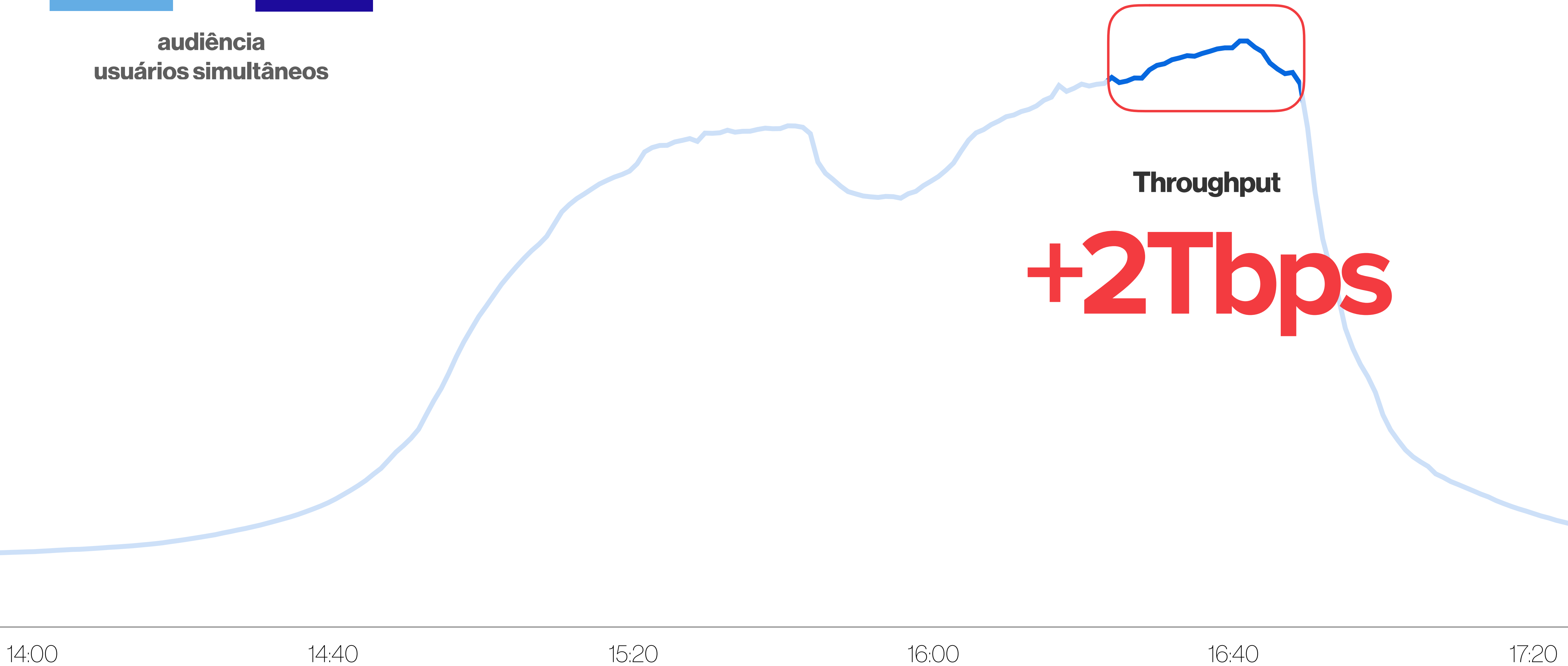




VS

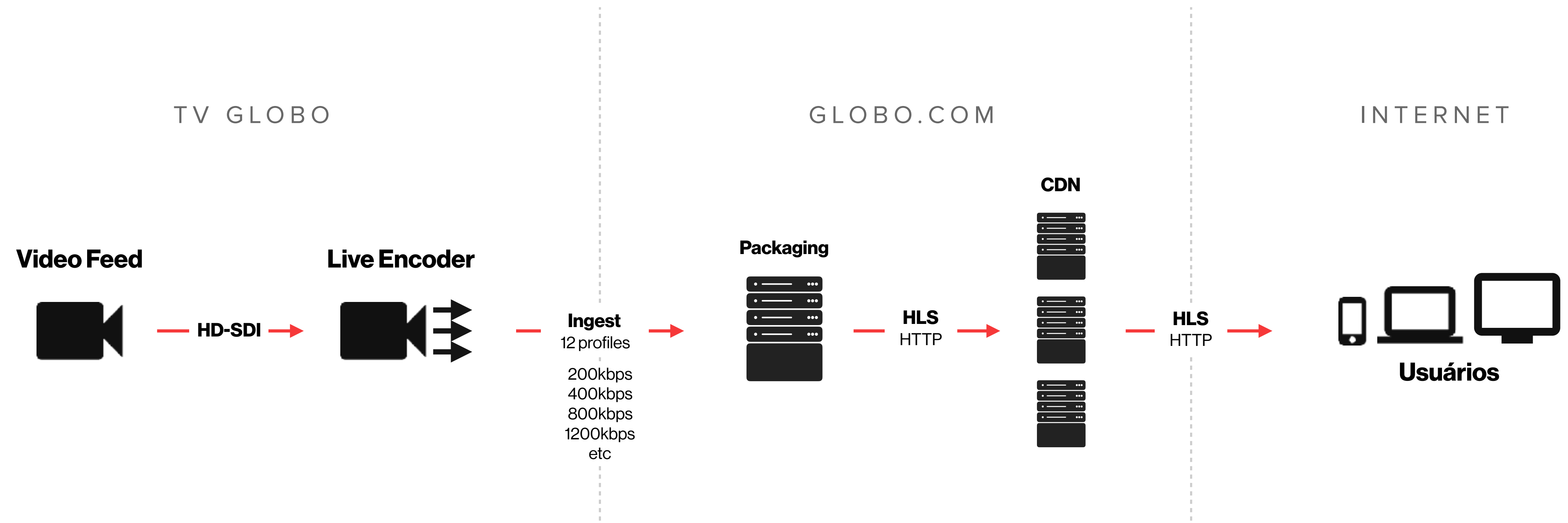


audiência
usuários simultâneos



Throughput

+2Tbps



TV GLOBO

GLOBO.COM

INTERNET

Video Feed



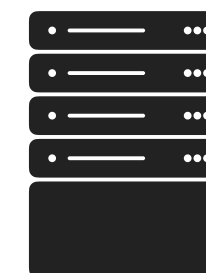
HD-SDI →

Live Encoder



→ **Ingest**
12 profiles →

Packaging



→ **HLS**
HTTP →

CDN



→ **HLS**
HTTP →



Usuários

TV GLOBO

GLOBO.COM

INTERNET

Video Feed

Live Encoder

Ingest
12 profiles

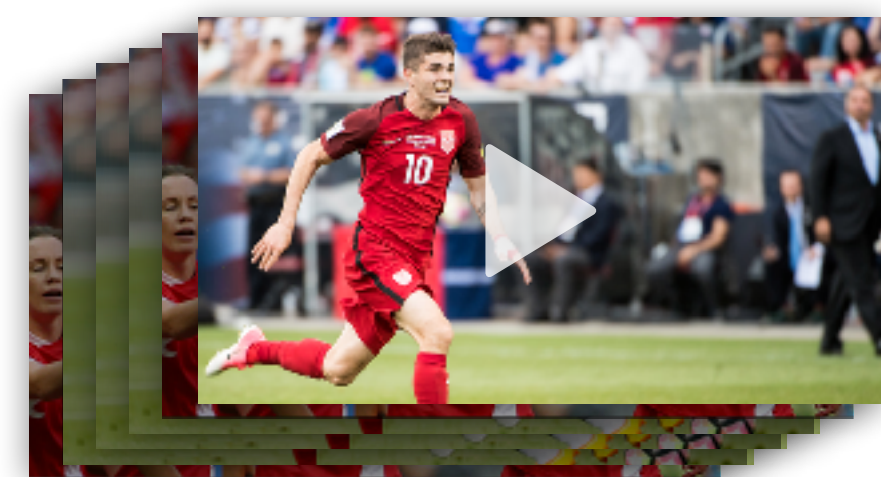
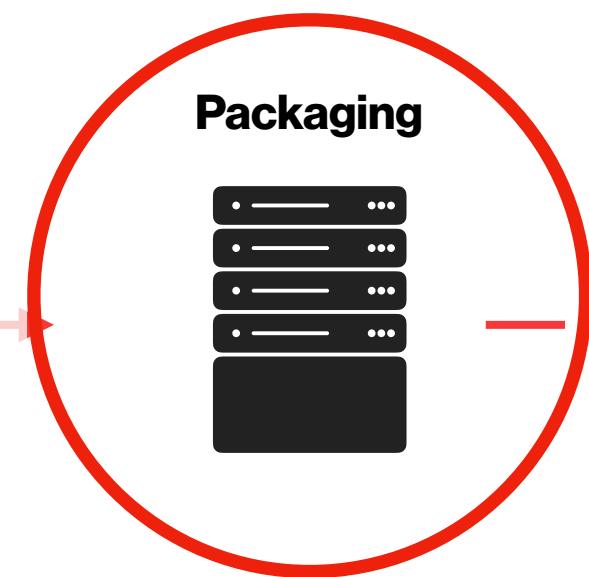
Packaging

HLS
HTTP

CDN

HLS
HTTP

Usuários



TV GLOBO

GLOBO.COM

INTERNET

Video Feed



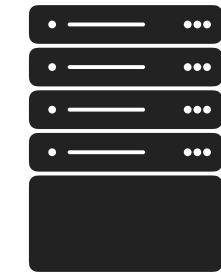
HD-SDI

Live Encoder



Ingest
12 profiles

Packaging



HLS
HTTP

CDN

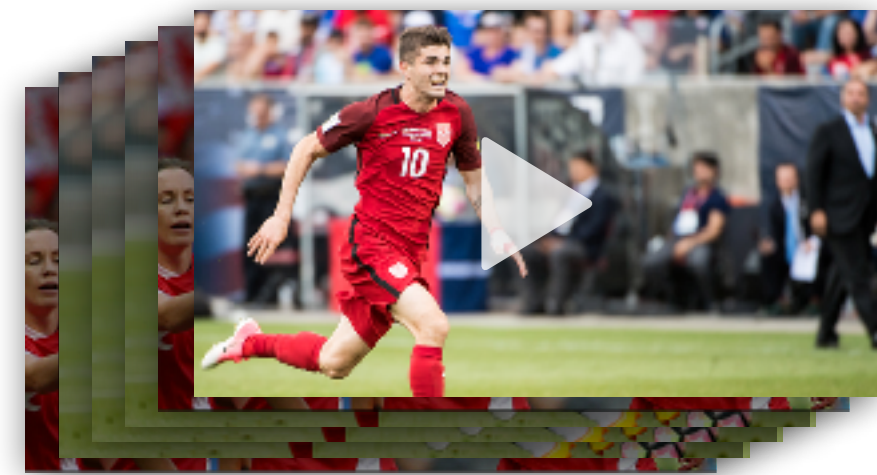


HLS
HTTP



Usuários

Video Chunks
(binary video file)



Fragmenting



00001.ts



00002.ts

TV GLOBO

GLOBO.COM

INTERNET

Video Feed



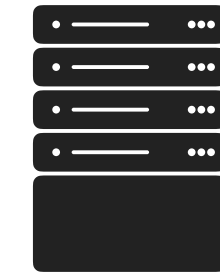
HD-SDI

Live Encoder



Ingest
12 profiles

Packaging



HLS
HTTP

CDN



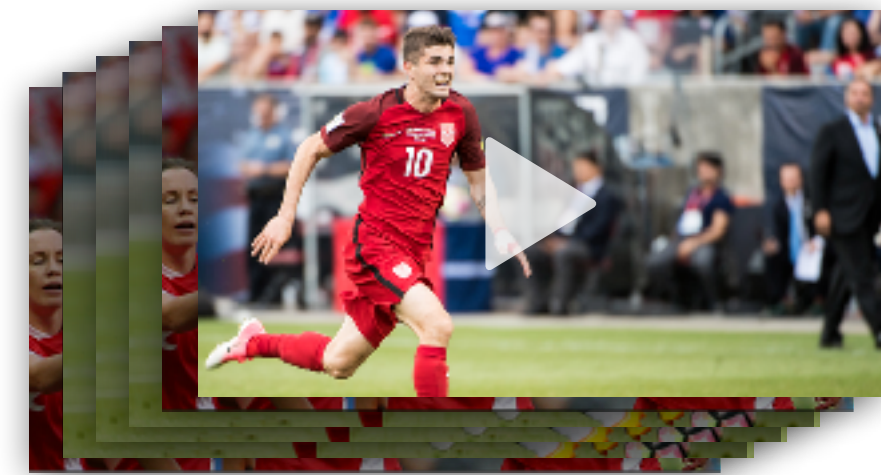
HLS
HTTP



Usuários

Video Chunks
(binary video file)

Playlist
(text file)



Fragmenting



00001.ts



00002.ts

00001.ts
00002.ts
00003.ts
00004.ts

1200kbps.m3u8

TV GLOBO

GLOBO.COM

INTERNET

Video Feed

Live Encoder

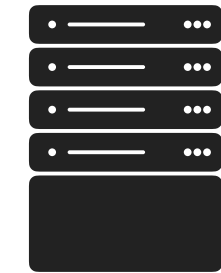


HD-SDI



Ingest
12 profiles

Packaging



HLS
HTTP

CDN



HLS
HTTP



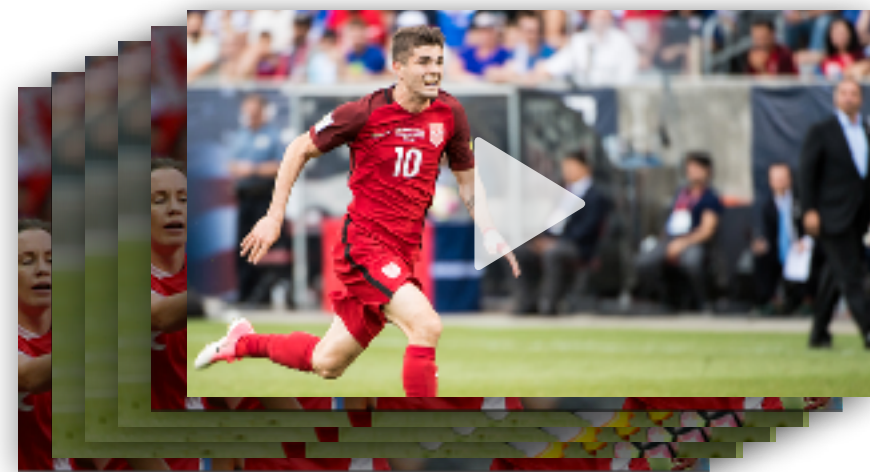
Usuários

Video Chunks
(binary video file)

Playlist
(text file)

Master Playlist
(text file)

Fragmenting



00001.ts



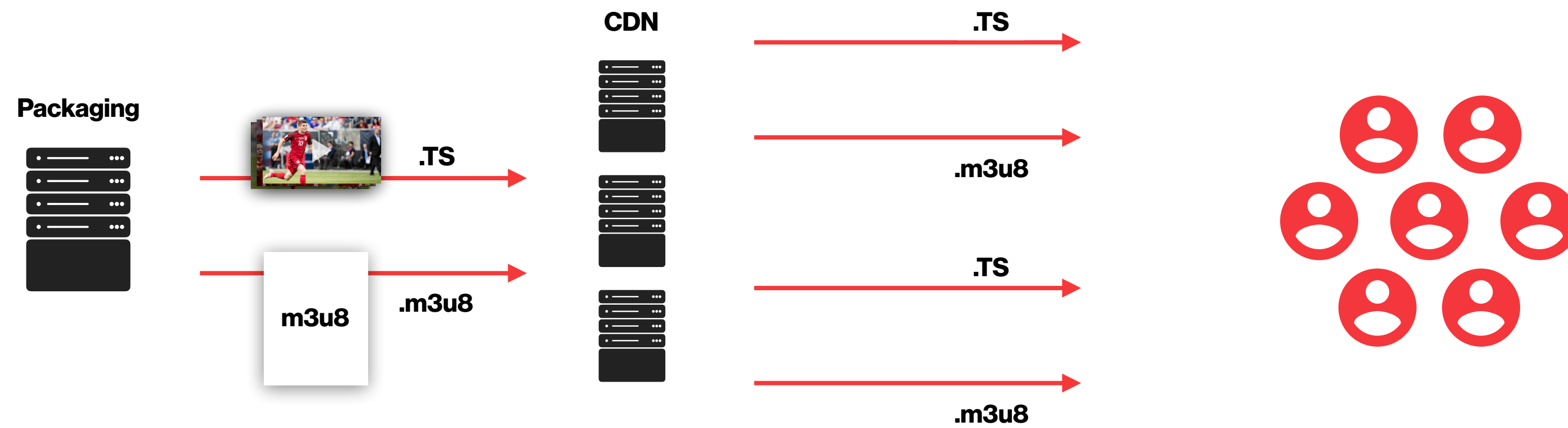
00002.ts

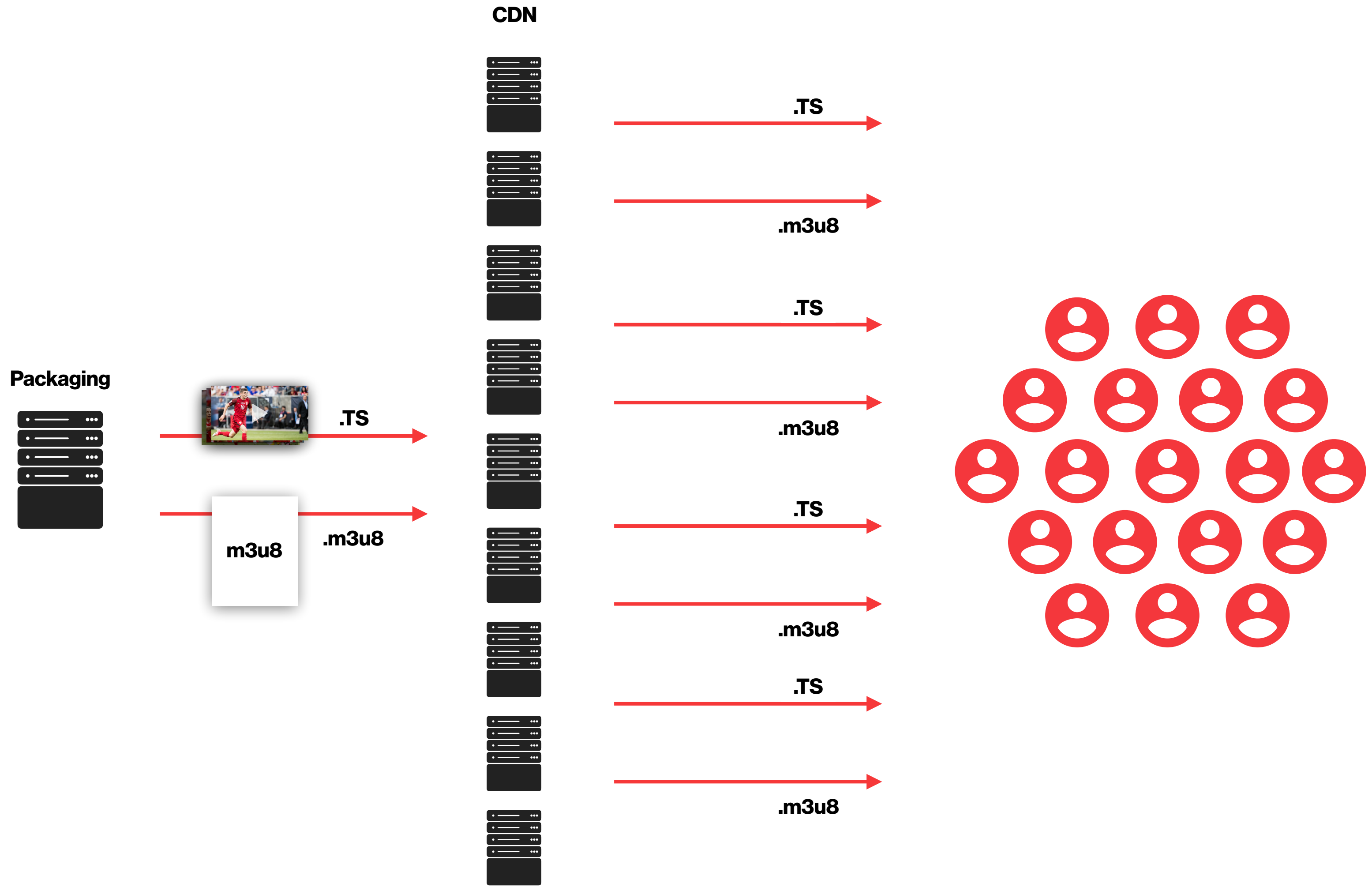
00001.ts
00002.ts
00003.ts
00004.ts

1200kbps.m3u8

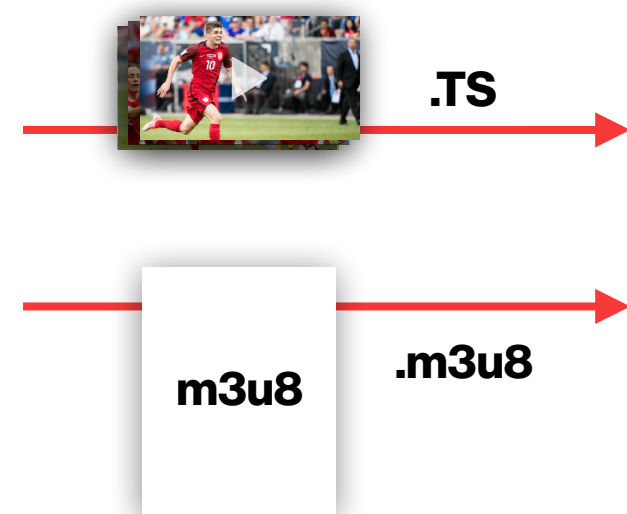
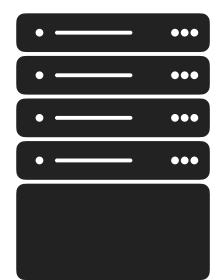
200kbps.m3u8
400kbps.m3u8
800kbps.m3u8
1200kbps.m3u8

copa2018_1200kbps.m3u8

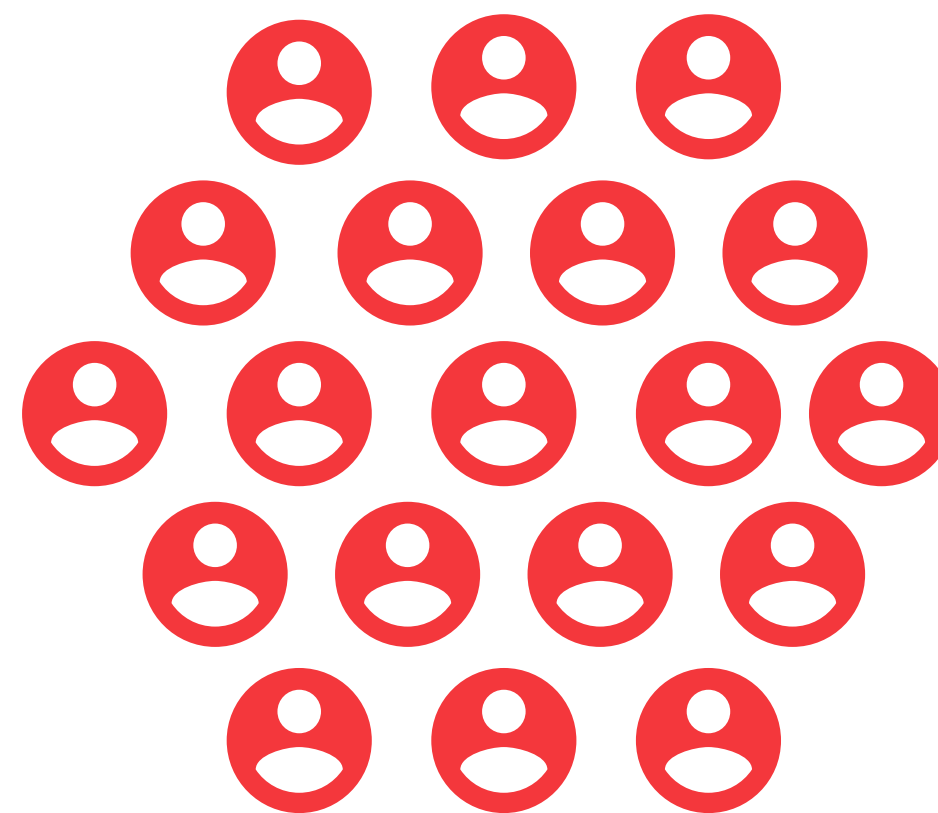
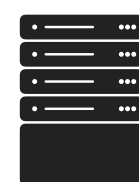
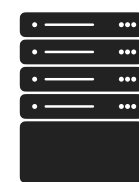
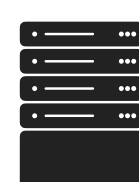
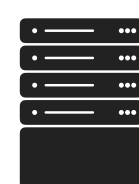
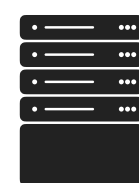
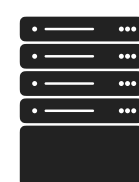
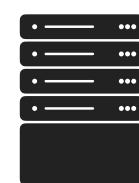
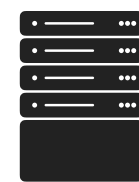




Packaging



CDN

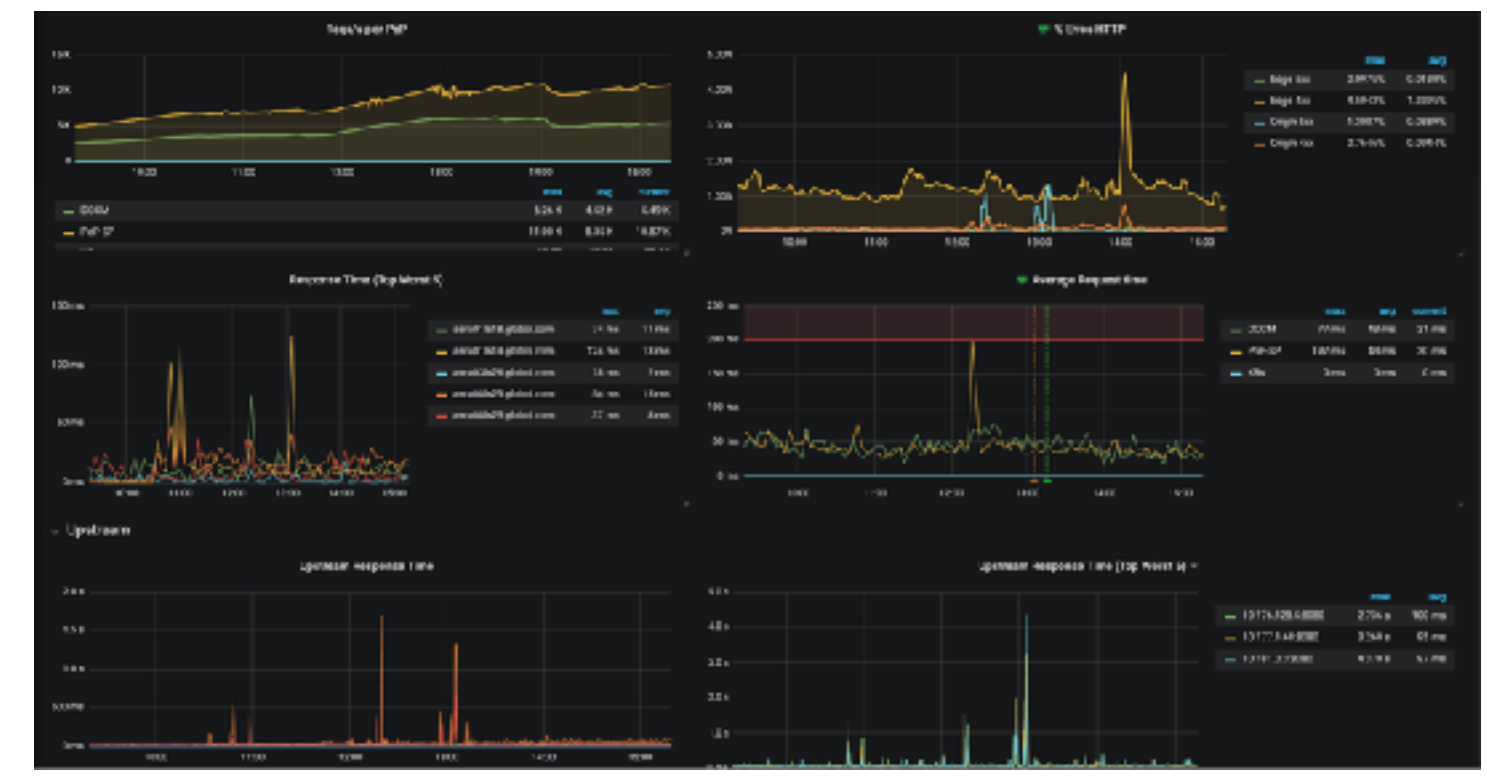
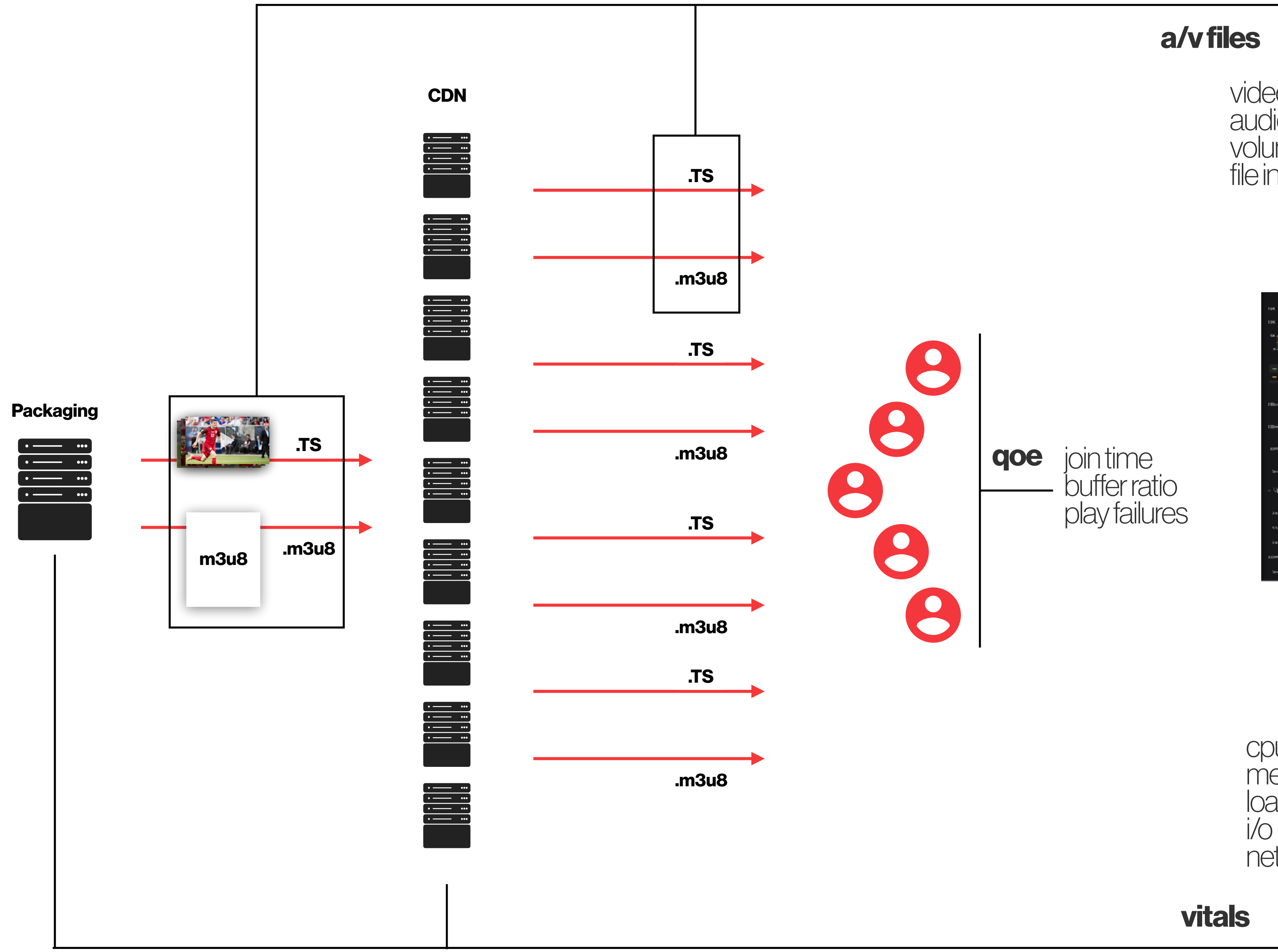


I/O disco

armazenamento

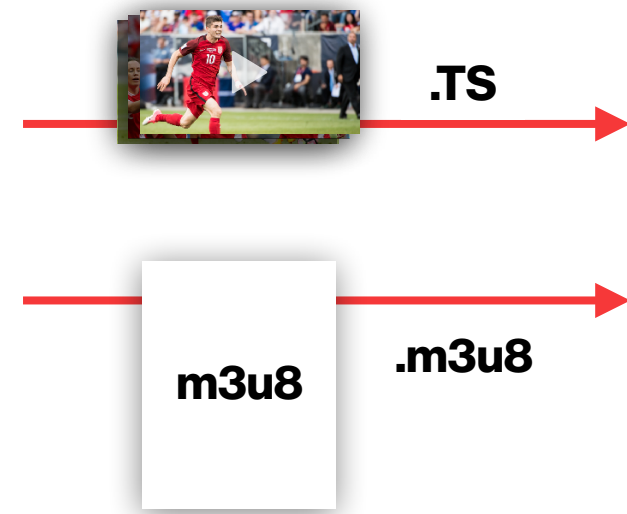
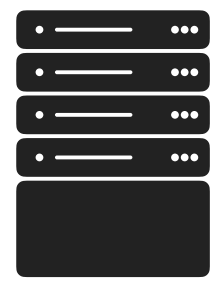
cache rotativo

I/O rede

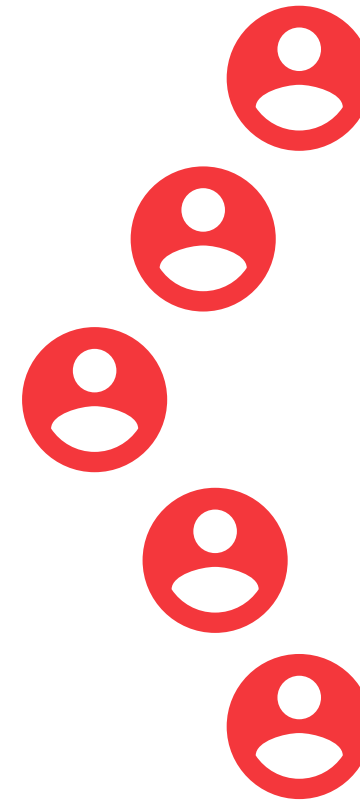
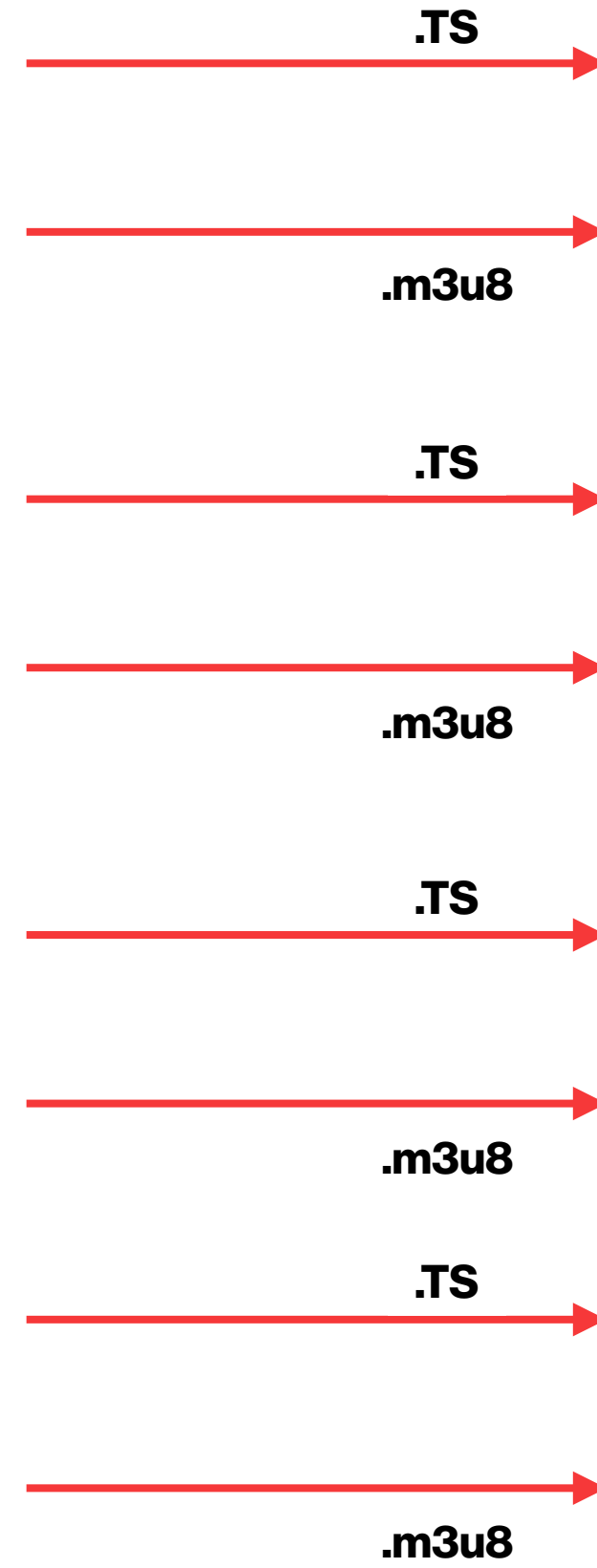


monitoring!

Packaging

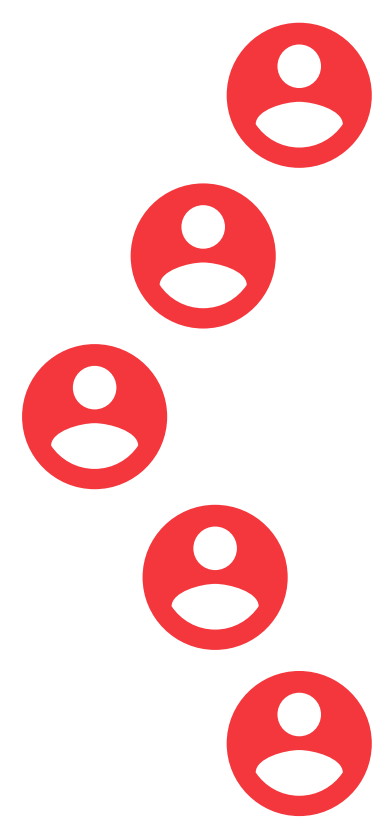
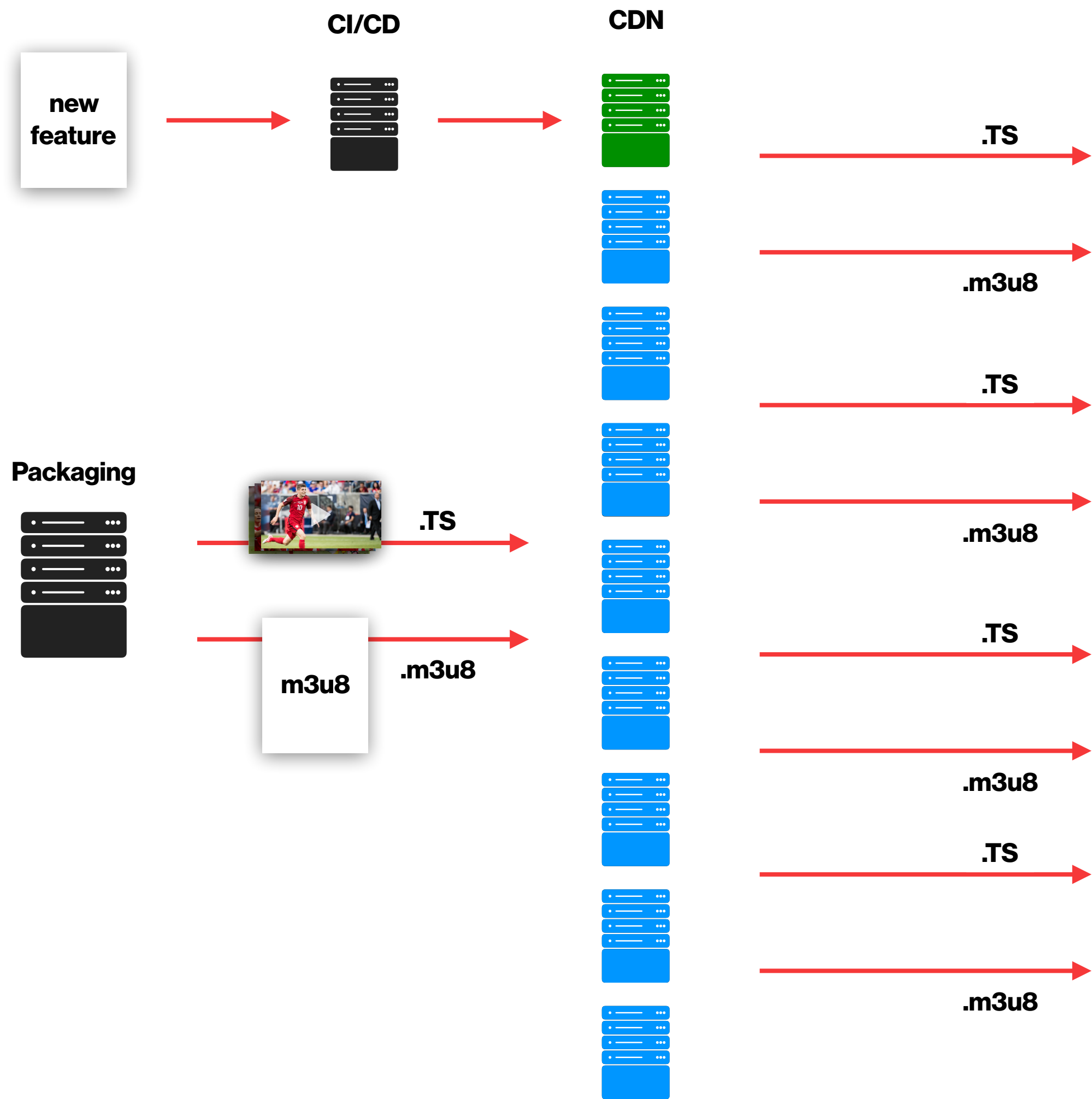


CDN



continuous delivery pipeline!

*testes automatizados
continuous integration
blue/green - canary releases*



continuous delivery pipeline!

*testes automatizados
continuous integration
blue/green - canary releases*



VS



**audiência
usuários simultâneos**

7:30

8:10

8:50

9:30

10:10

10:50

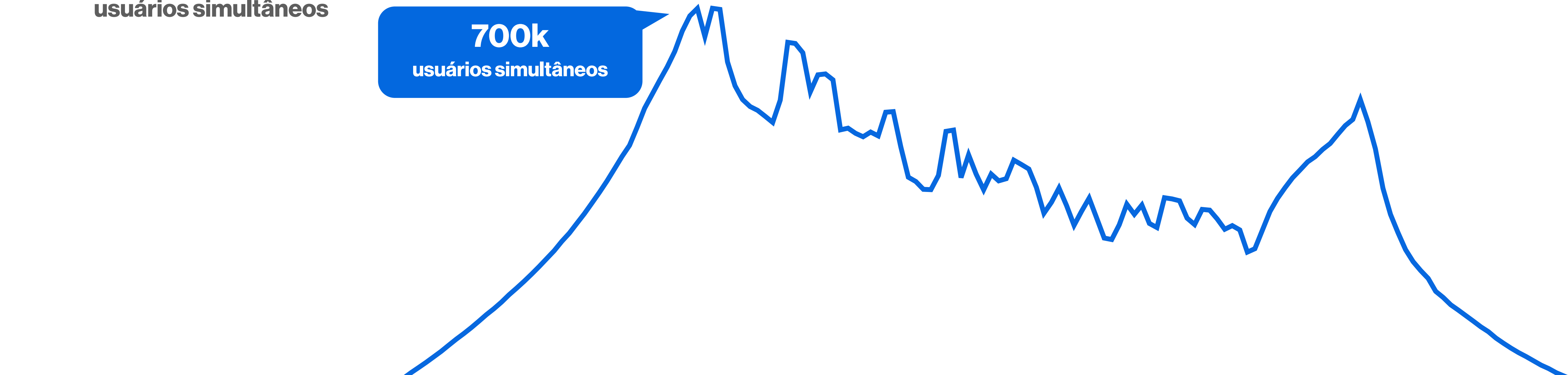


VS



audiência
usuários simultâneos

700k
usuários simultâneos



7:30

8:10

8:50

9:30

10:10

10:50



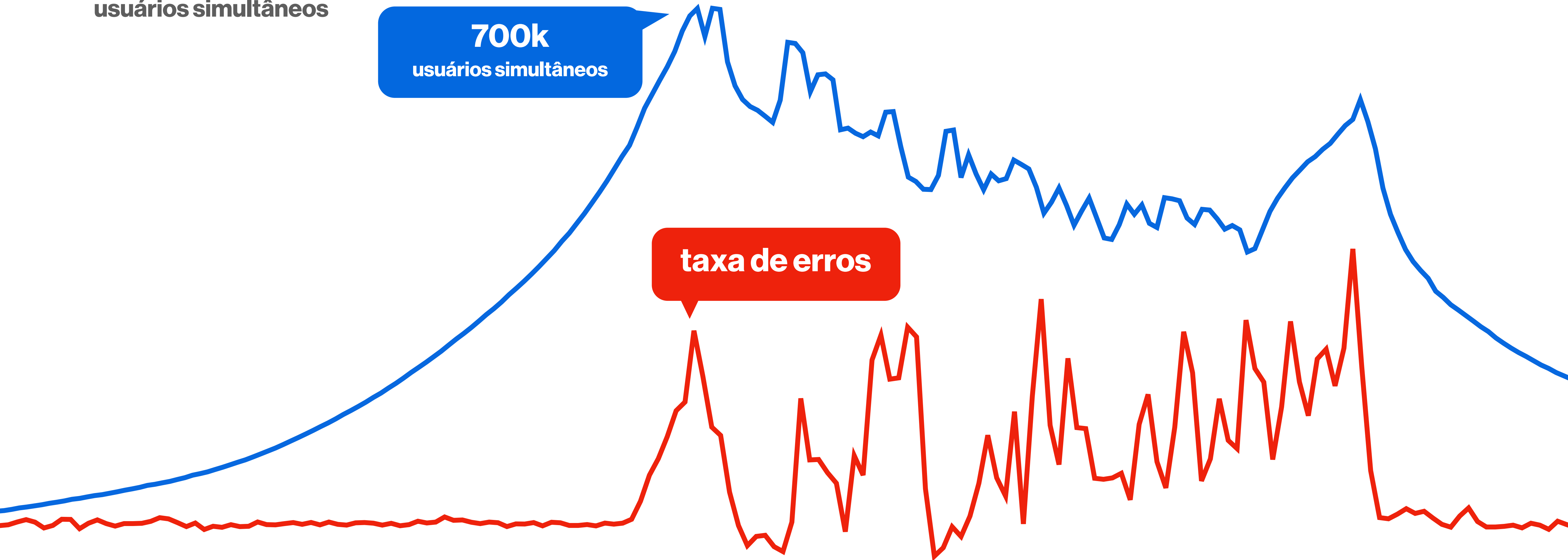
VS



audiência
usuários simultâneos

700k
usuários simultâneos

taxa de erros



7:30

8:10

8:50

9:30

10:10

10:50

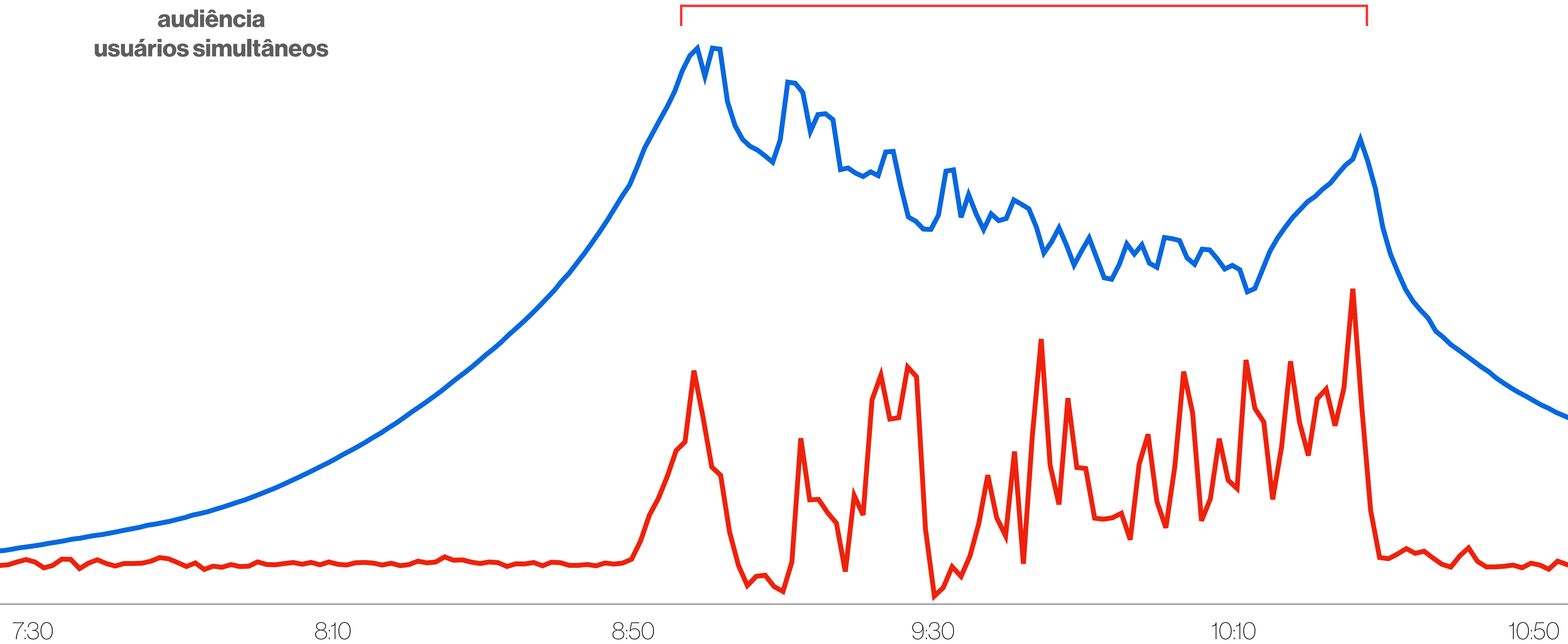


vs

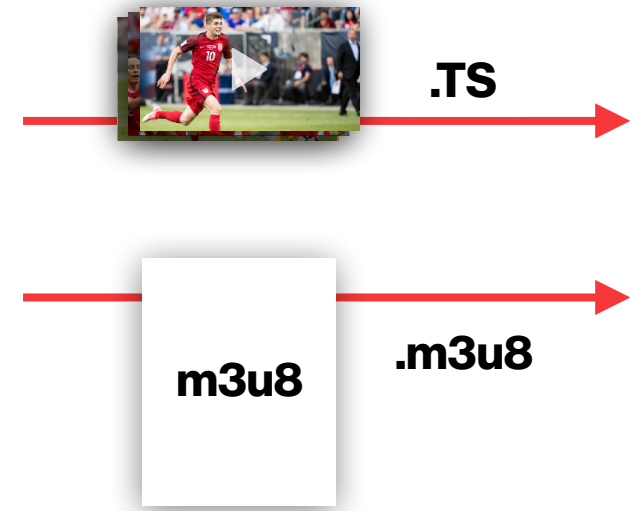
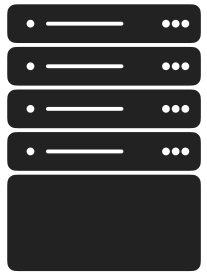


audiência
usuários simultâneos

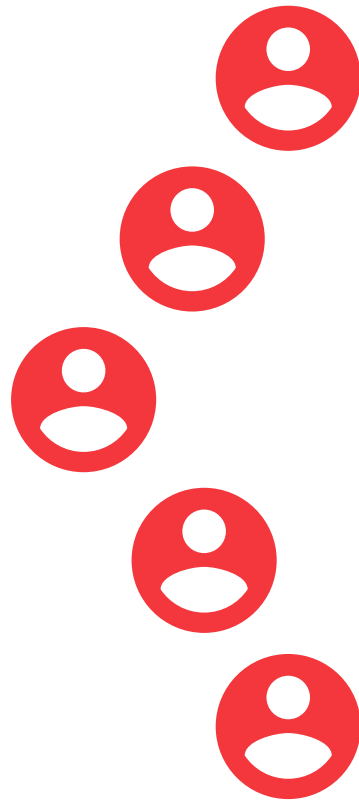
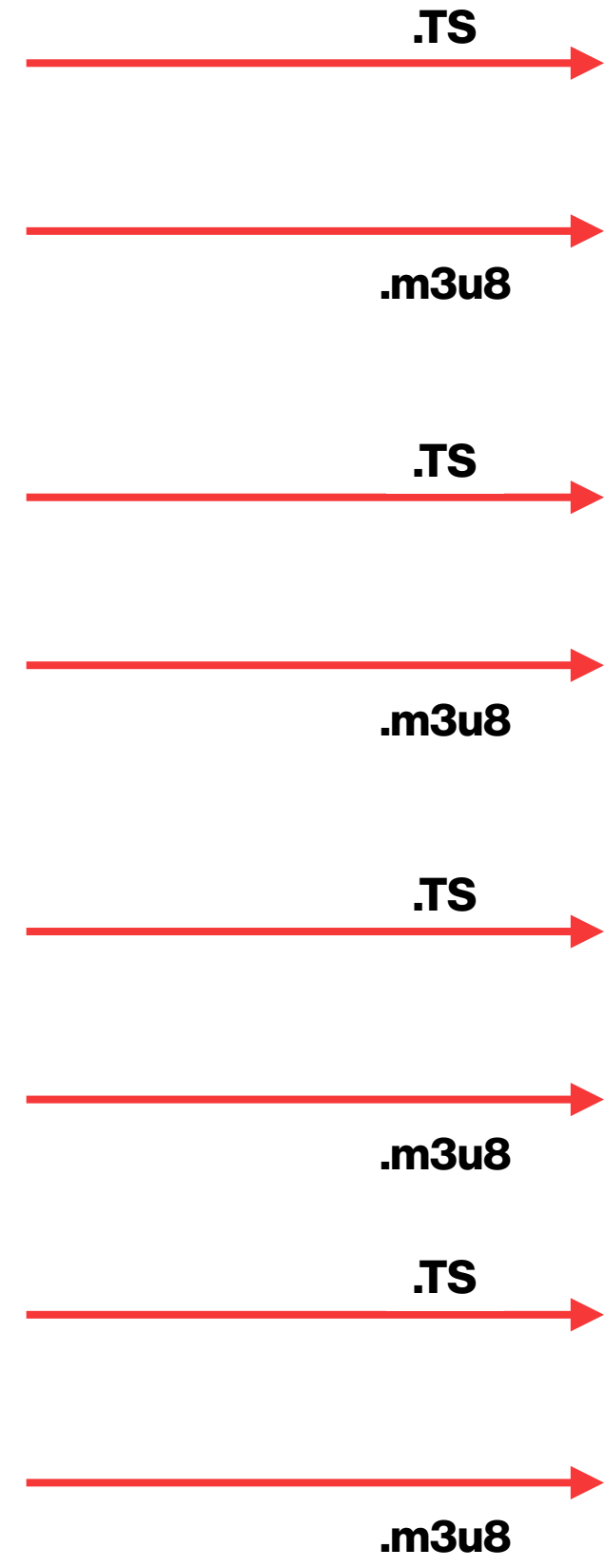
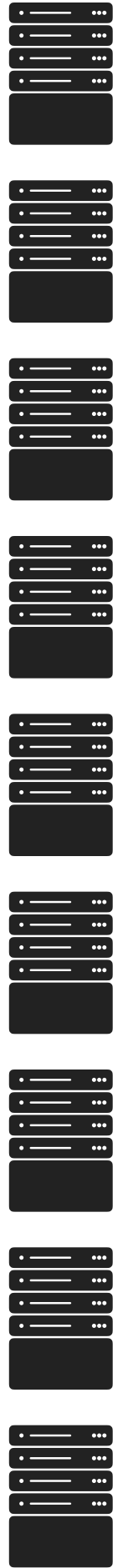
1:30 outage



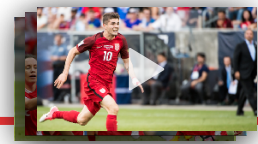
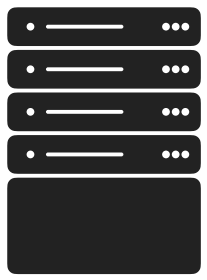
Packaging



CDN



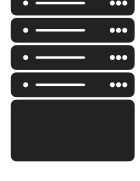
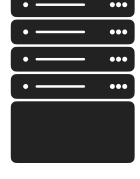
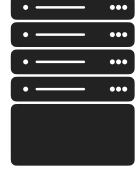
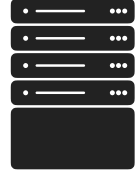
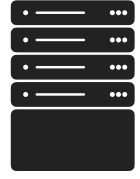
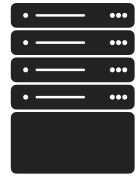
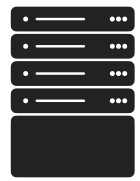
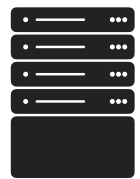
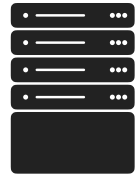
Packaging



.TS

.m3u8

CDN



.TS

.m3u8

.TS

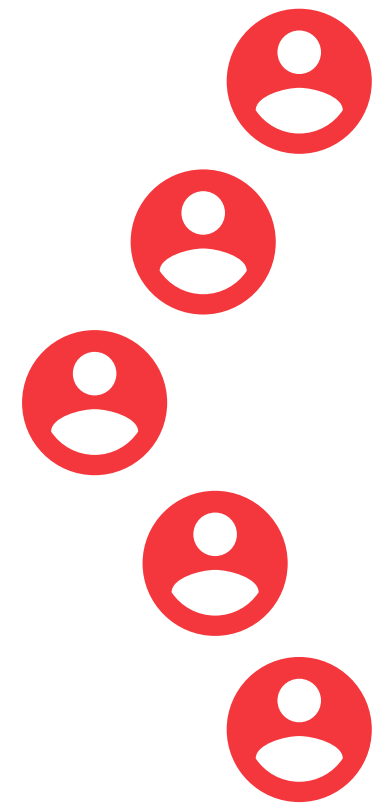
.m3u8

.TS

.m3u8

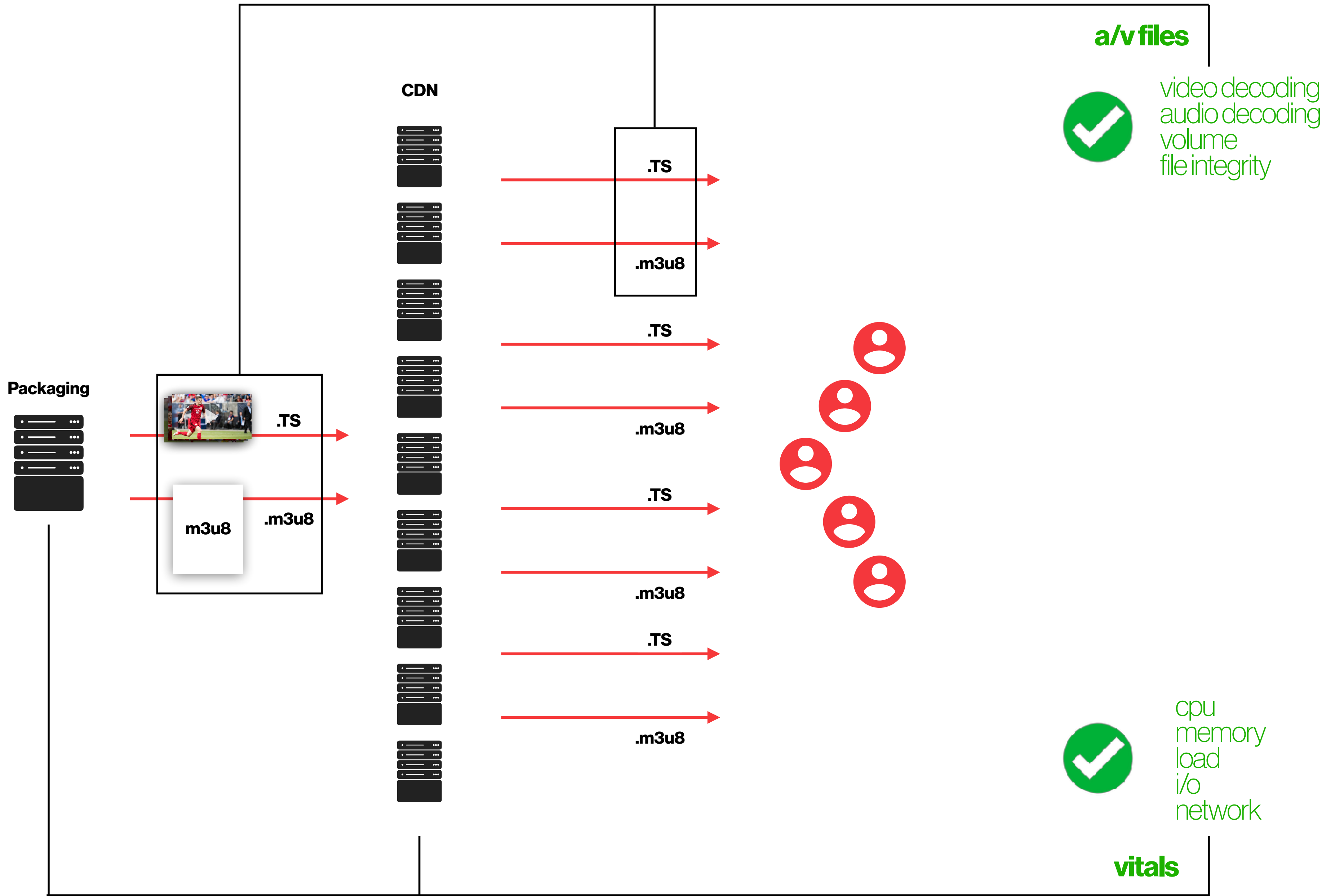
.TS

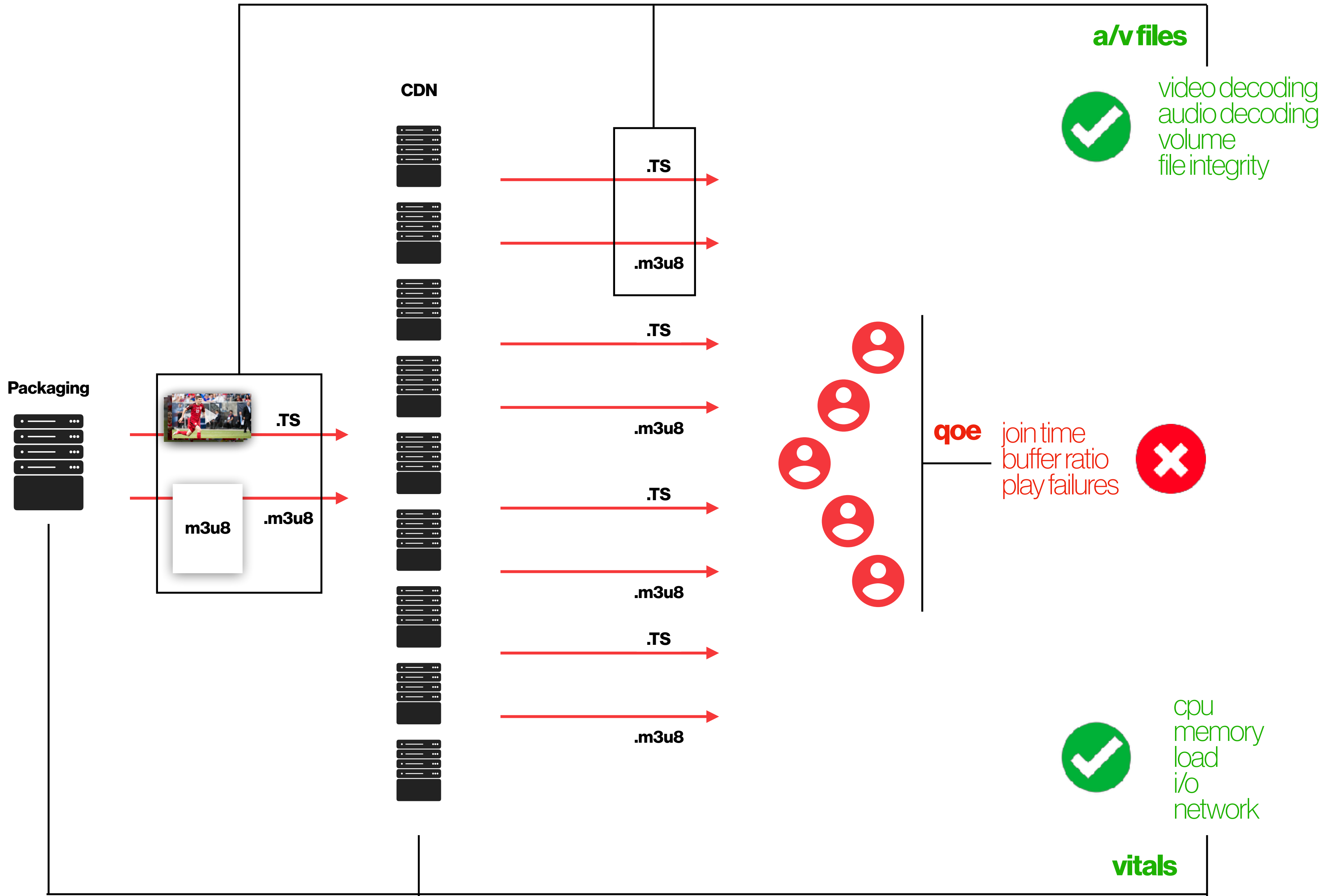
.m3u8



vitals

cpu
memory
load
i/o
network





a/v files



video decoding
audio decoding
volume
file integrity

qoe

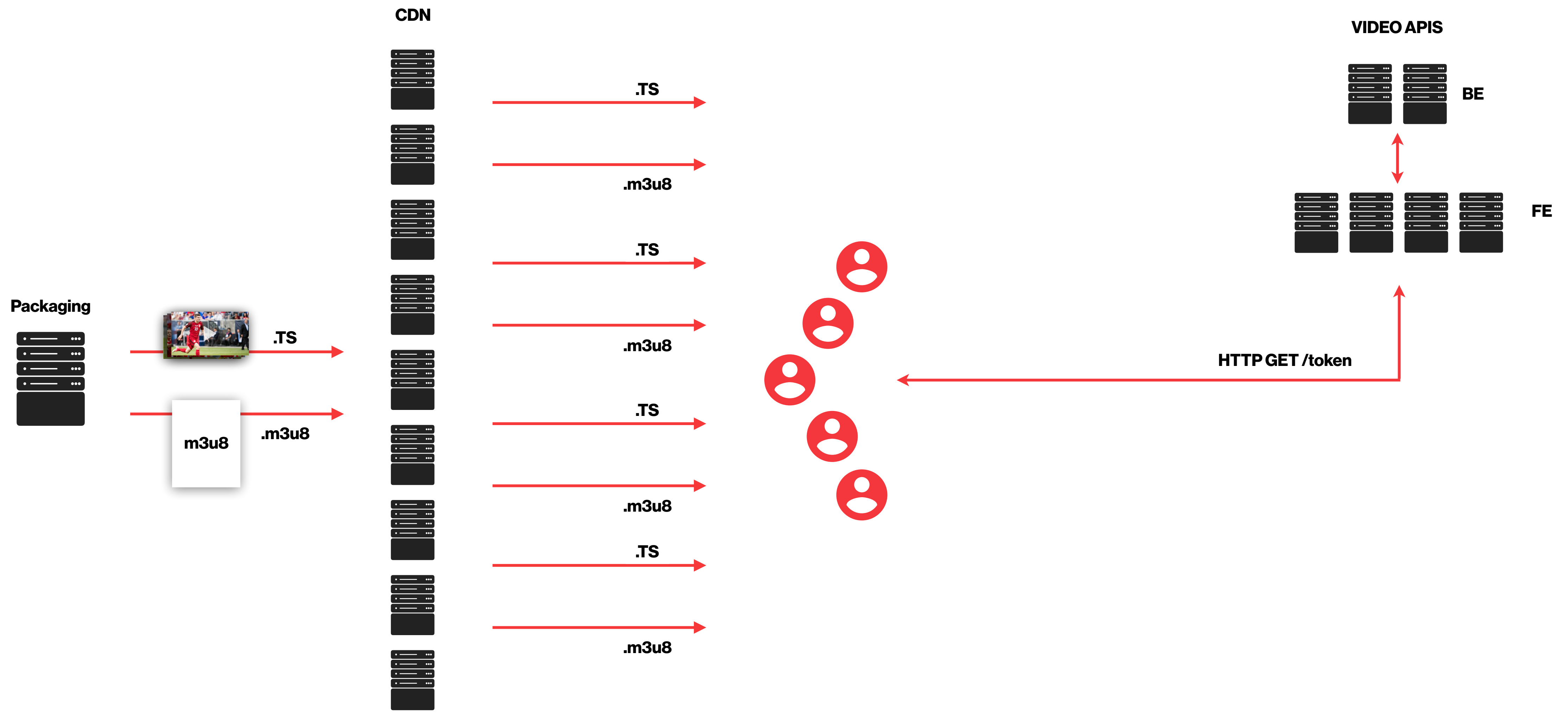
join time
buffer ratio
play failures

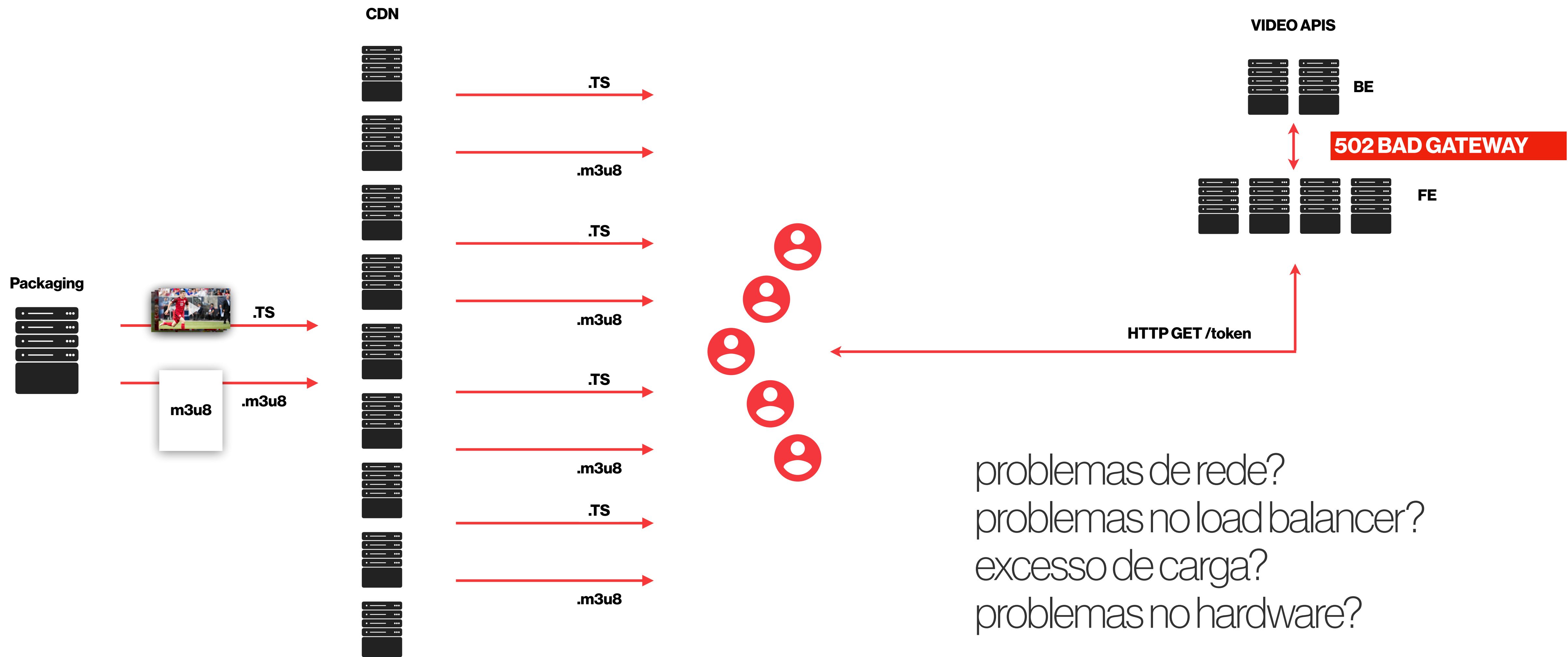


vitals



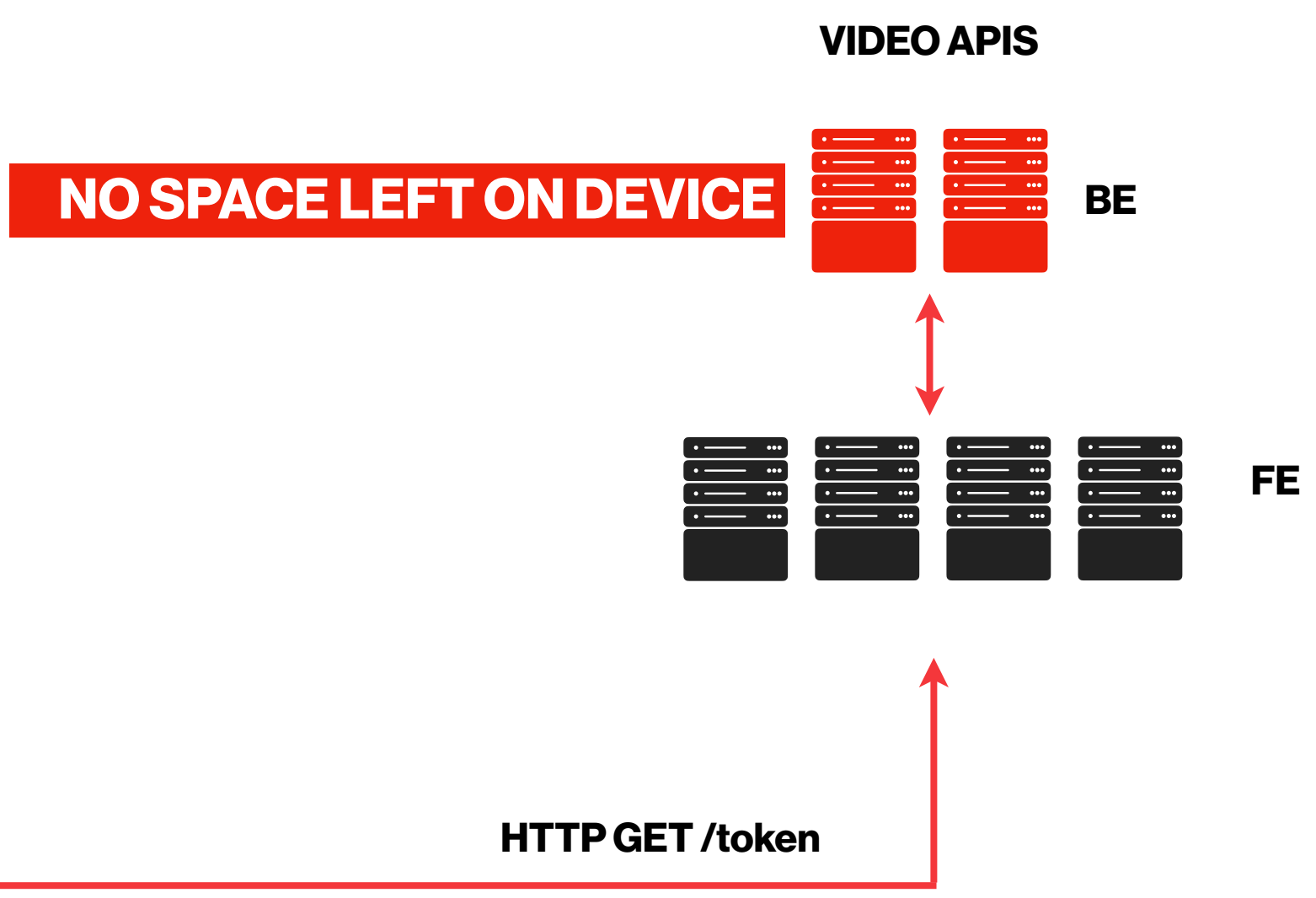
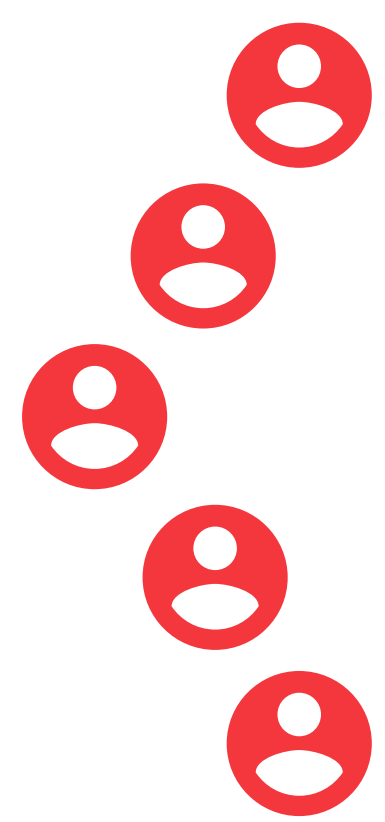
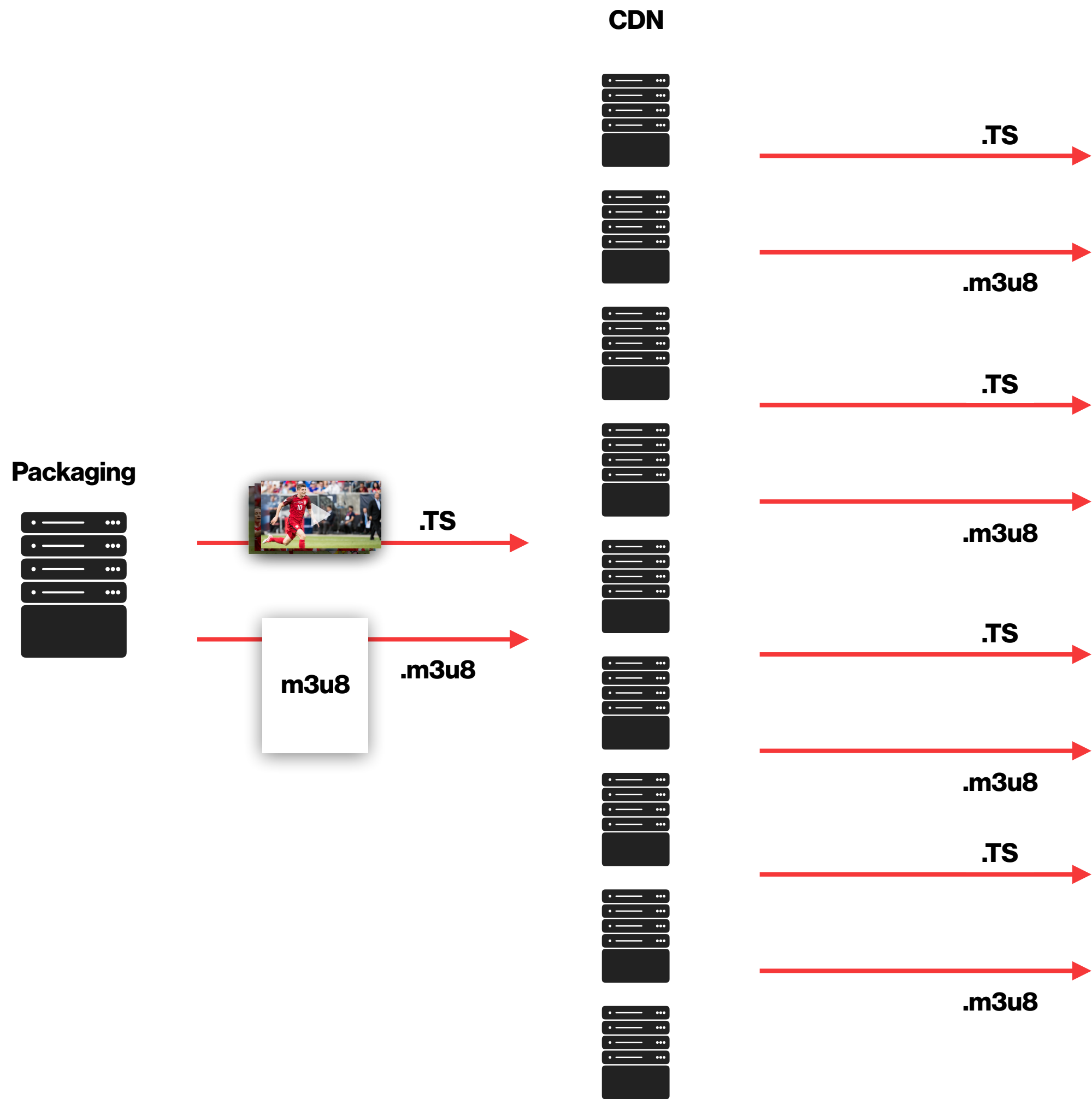
cpu
memory
load
i/o
network





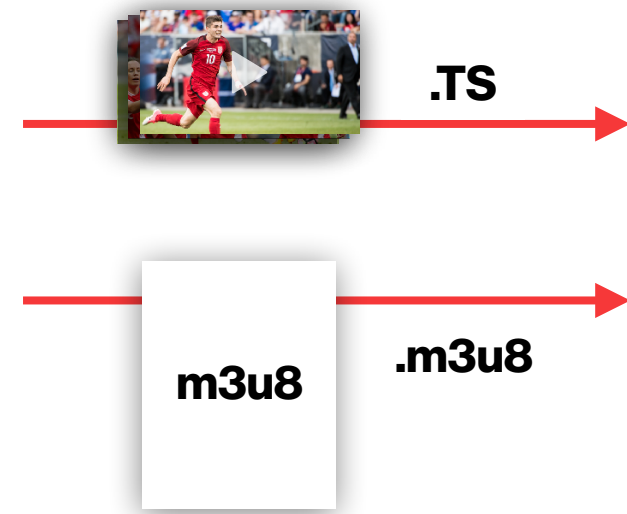
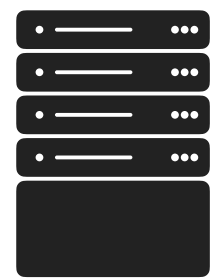
problemas de rede?
problemas no load balancer?
excesso de carga?
problemas no hardware?

...

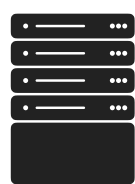
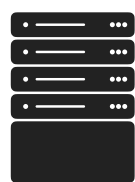


WTF!!!!!!

Packaging



CDN



.TS

.m3u8

.TS

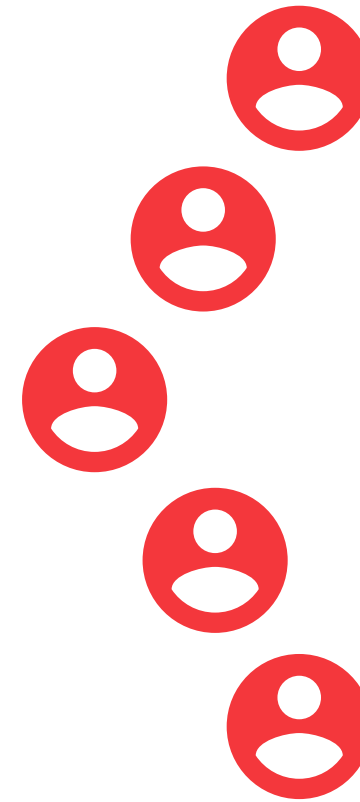
.m3u8

.TS

.m3u8

.TS

.m3u8



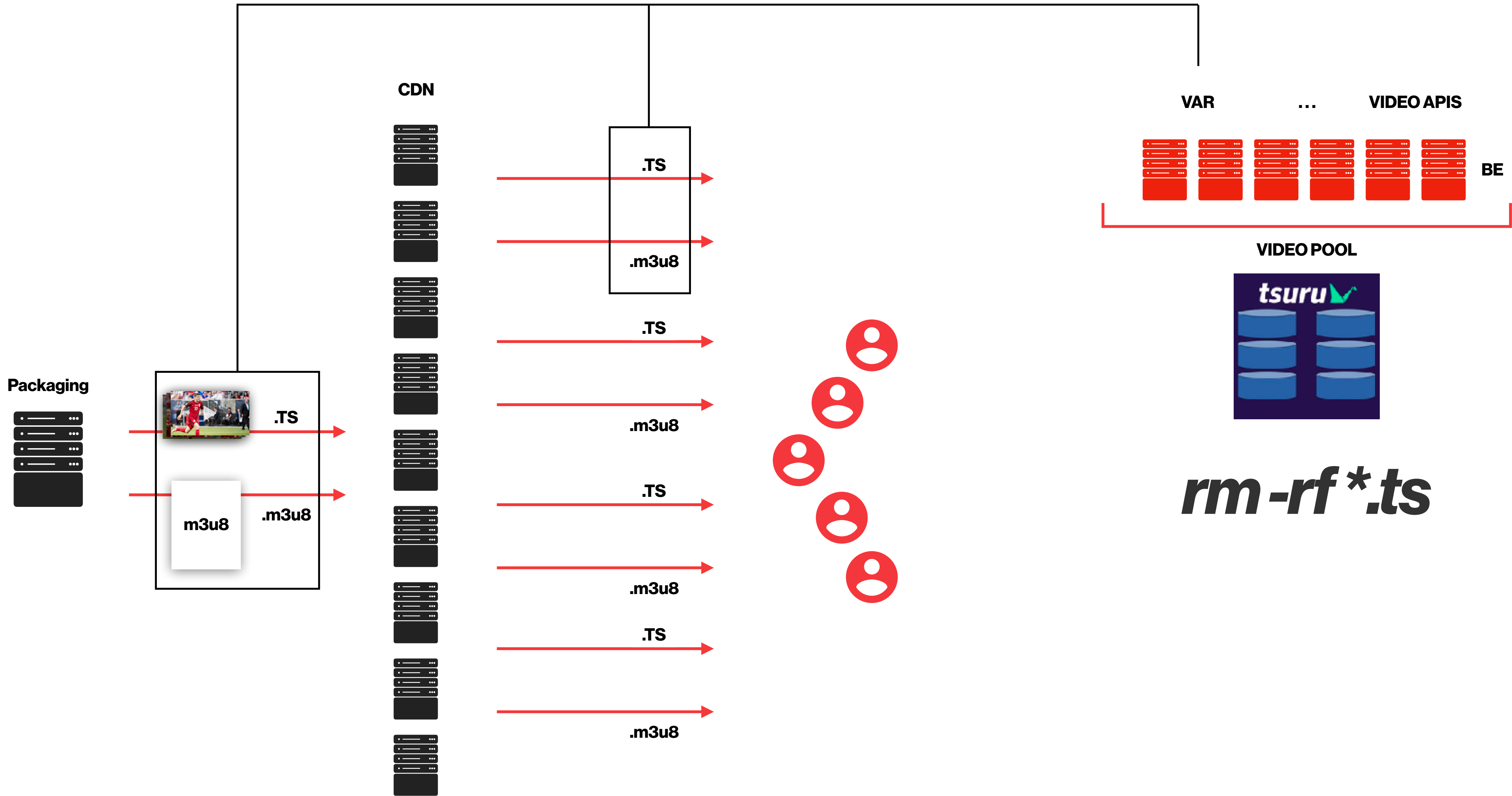
... **VIDEO APIS**



BE

VIDEO POOL





*rm -rf *.ts*

post mortem

qual impacto?

como foi detectado?

como foi resolvido?

qual causa raiz?

ações para que não ocorra novamente!

post mortem

porque a monitoração de espaço físico não alarmou?

porque o VAR não apagou os arquivos do disco?

porque demoramos a identificar e resolver o problema?

5 dias antes . . .

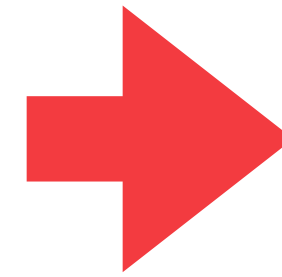
**novο processo de auto-healing gerando
falsos positivos na monitoração**

!!! monitoração desligada !!!

3 dias antes . . .



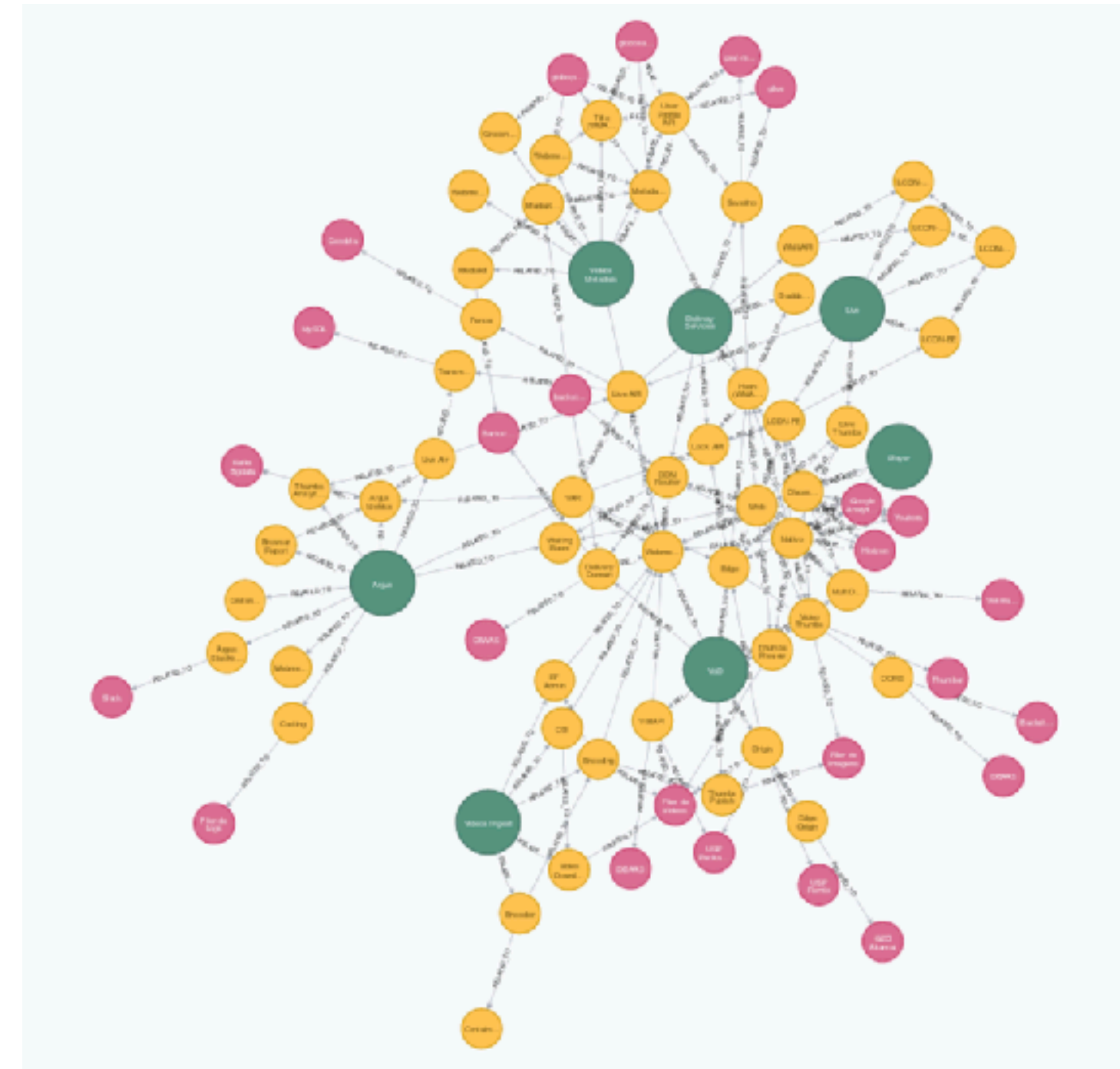
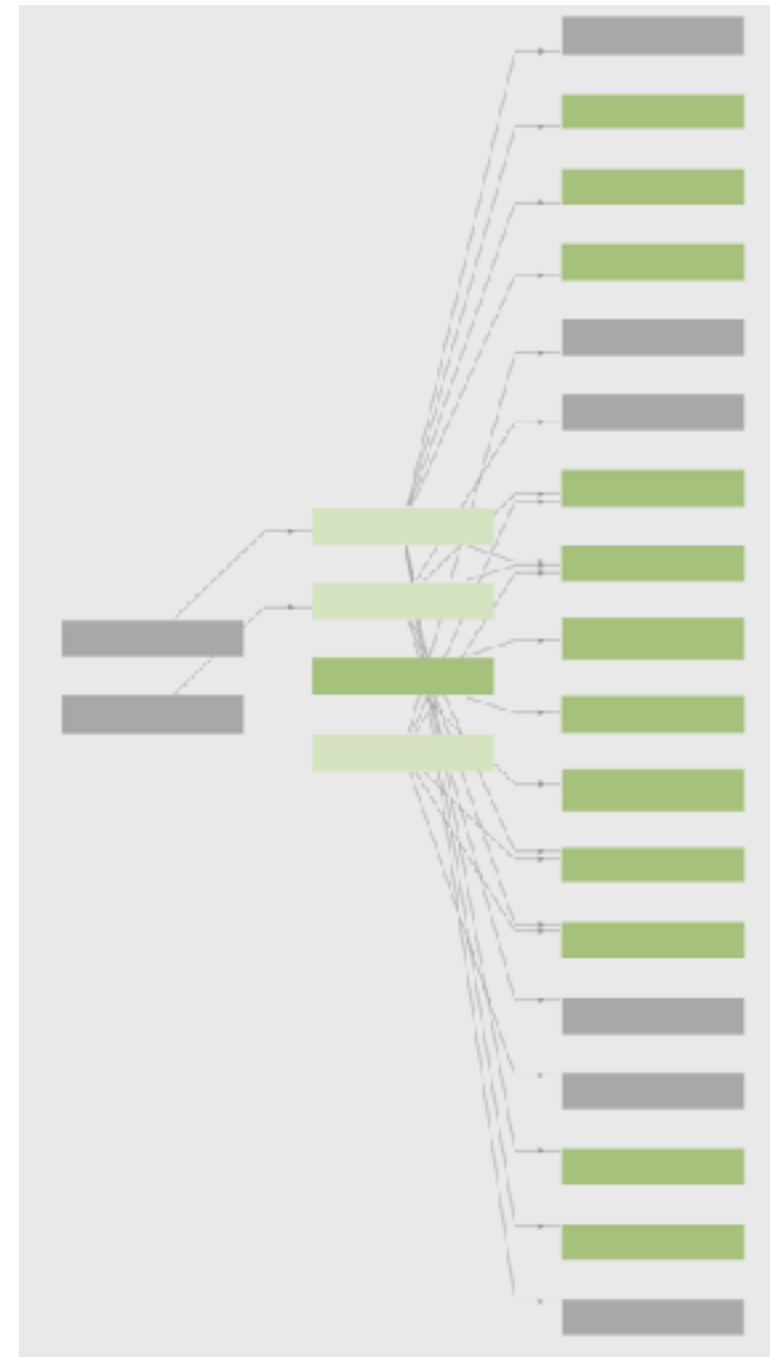
00001.ts



abcde.ts

!!! regex based rule broken !!!

no dia . . .



!!! falta de um mapa de dependências !!!

lições aprendidas

tenha um bom mapa de dependências

tenha uma monitoração útil

fomente uma cultura de post-mortem



QUANDO TUDO DÁ ERRADO

O CASE DO OUTAGE NA TRANSMISSÃO DA COPA 2018

TALENTOS.GLOBO.COM

RAFAEL.PEREIRA@CORP.GLOBO.COM

-

LINKEDIN.COM/IN/RAFAELSPEREIRA

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