Pandemic Impact on Global Internet Traffic
NANOG June 2020

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Nokia Deepfield Background

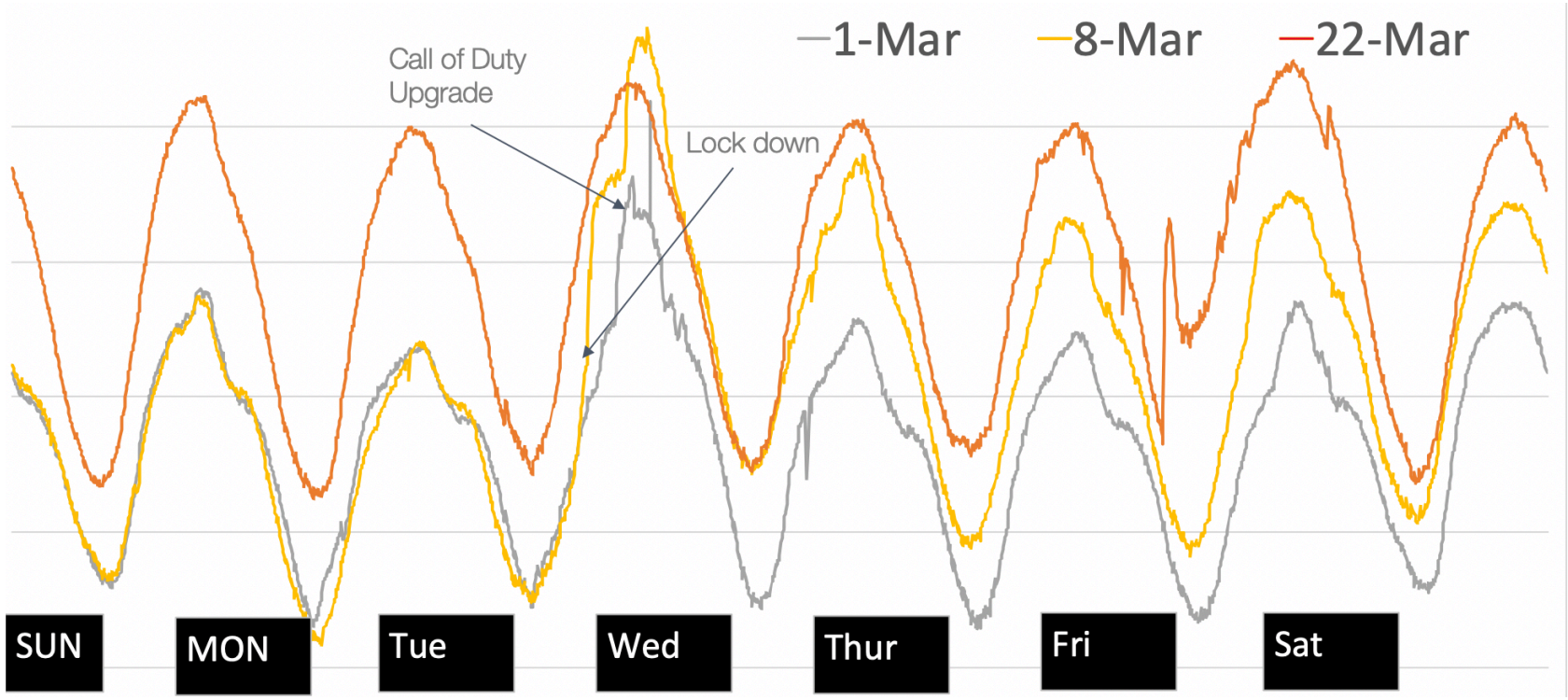
- Pandemic Analysis
  - Methodology similar to NANOG / SIGCOMM 2010 “Internet Inter-domain Traffic”
  - Partnership with more than 50 providers around globe
- Data
  - Real-time streaming telemetry from most CSP backbone and aggregation routers
  - Includes significant portion large NA, EU, Asia CSP as well as global transit
  - Traffic volumes, applications, geographies as well as capacity and security

Pandemic Impact on Global Internet

- Unprecedent growth in global Internet traffic
  - Most network see 30-45% growth over one year
  - Now seeing 30-60% peak (usually evening) growth over last four weeks in impacted regions
  - Networks met demand and maintained QoE through “peak Internet”
- Industry response
  - Acceleration of port turn-ups (especially AWS, Netflix, Google) adding multi Tbps capacity
  - Significant migration to cloud (e.g. Zoom moving to AWS, Oracle)
  - Netflix, YouTube and Zoom reduction in video streaming rates
  - Open / settlement-free peering (e.g. Telefonica)

Week over Week Comparison

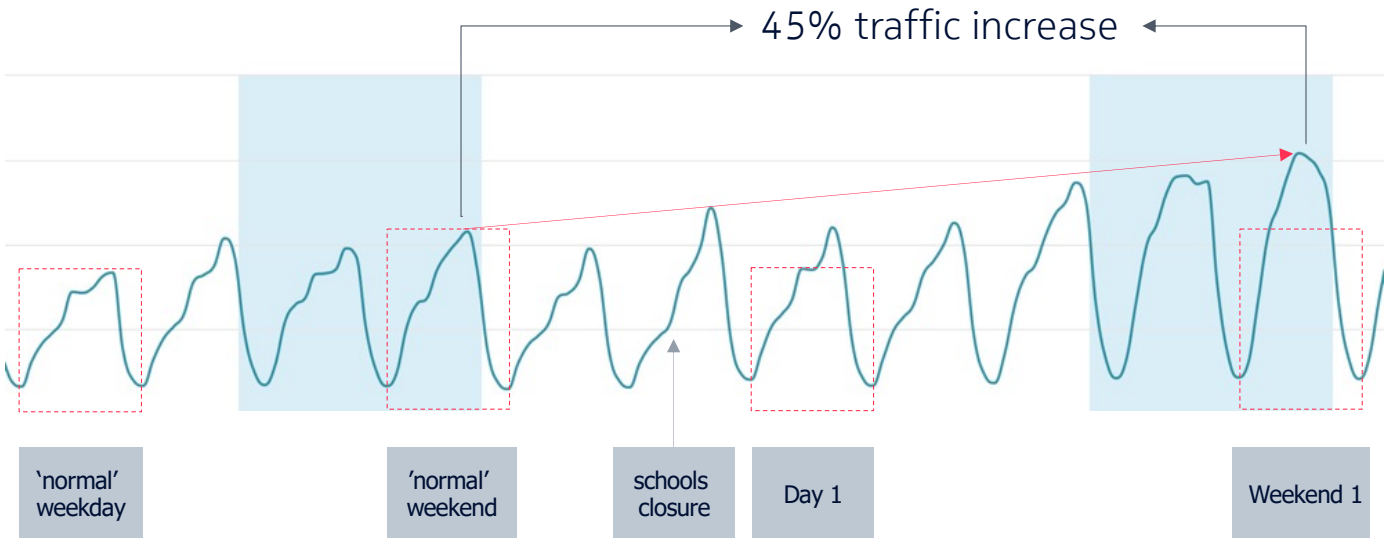
EU Providers first three weeks of March 2020



Daily and weekly traffic patterns changed dramatically
Data Normalized Across US, EU and LATAM Providers

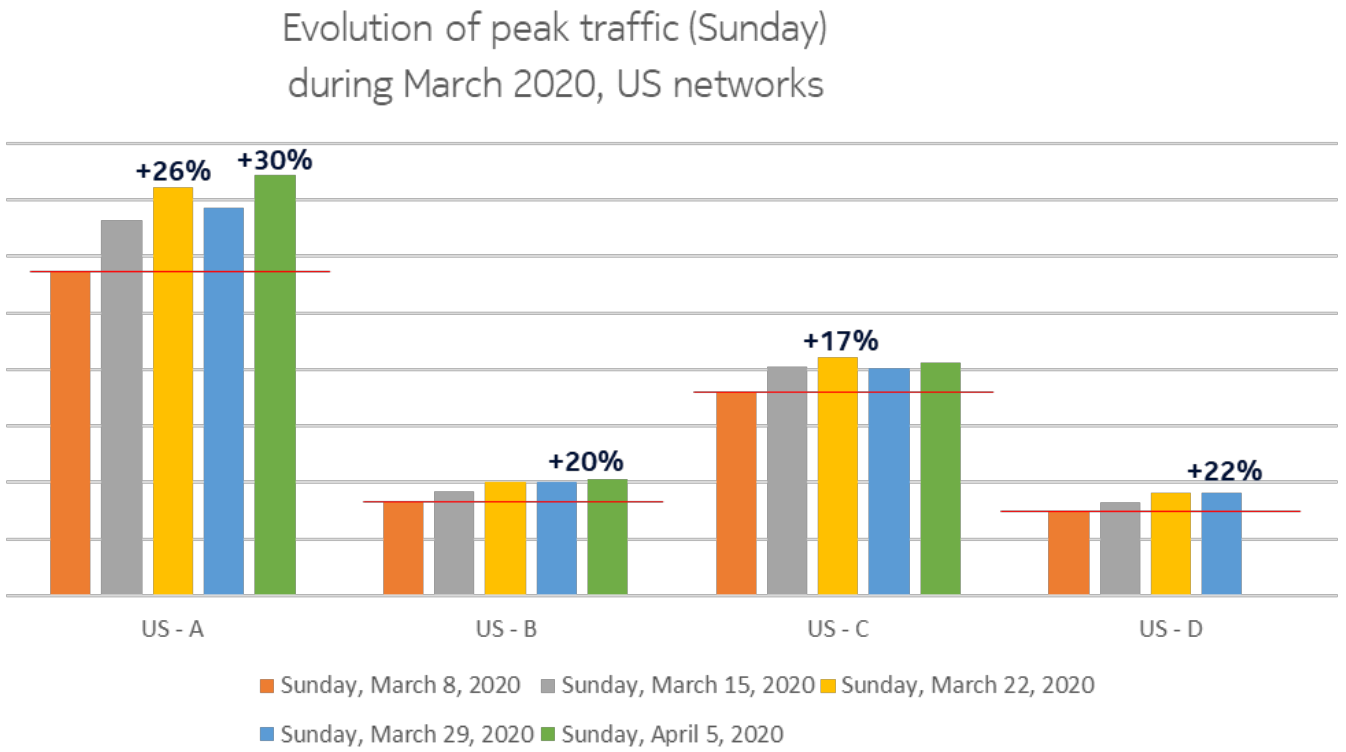
Lockdown measures had a significant impact on network traffic:

- Increase of daily traffic
- Longer 'hold' hours
- Earlier start of video streaming hours
- Rise of videoconferencing
- Tremendous increase in weekend peak traffic

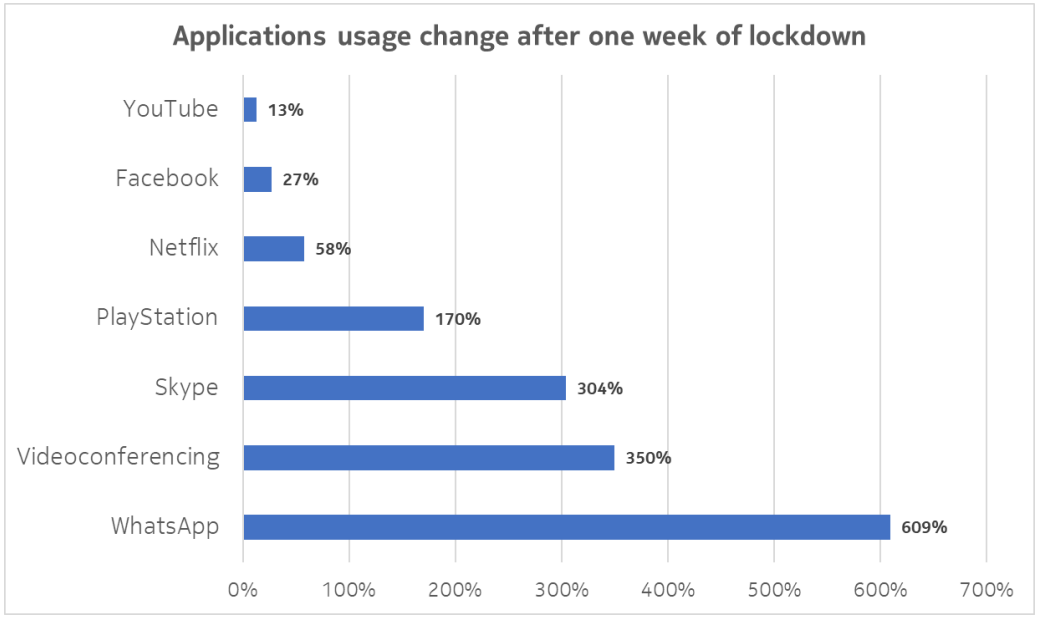


Networks experienced typical yearly growths (40-50%) in just a few weeks (or days!)

March 2020
Peak network traffic (Sundays)

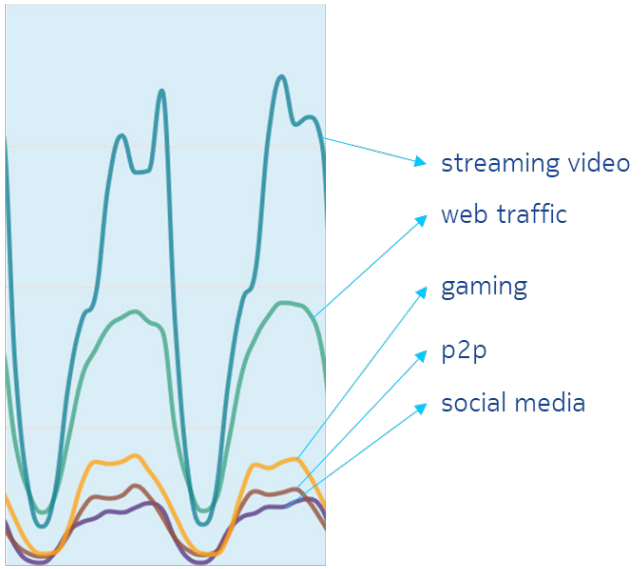


Application usage changes after one week of lockdown



Big changes in application usage,
but how do they affect the network?

Anatomy of a "jagged mountain"
(curve outlining daily traffic peaks)

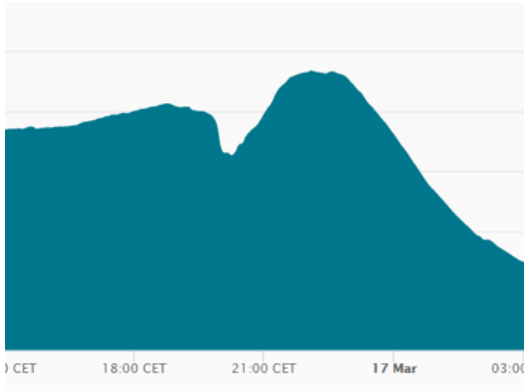


Weekend traffic,
European country in lockdown

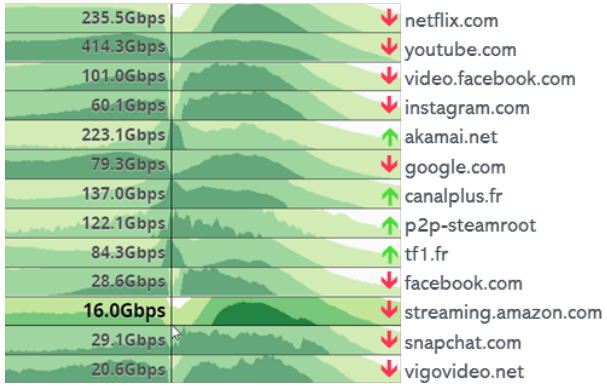
Network impact of flash events
Public announcements

Event:

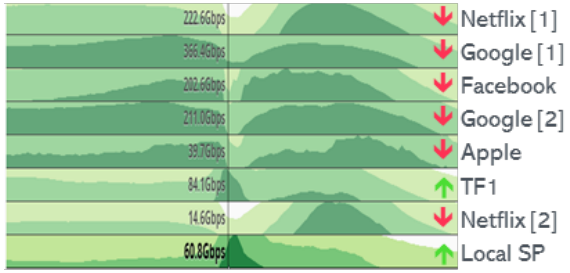
- **Lockdown speech by French president at 8pm**
- Substantial drop in network traffic levels



- At application level:
  - Substantial **decrease** in OTT entertainment video and social networks
  - Increase in OTT local video (Canal+, TF1)



- At peering level:
  - Substantial **decrease** in peering towards OTT entertainment video and social networks
  - Increase in peering towards local OTT players and local service providers

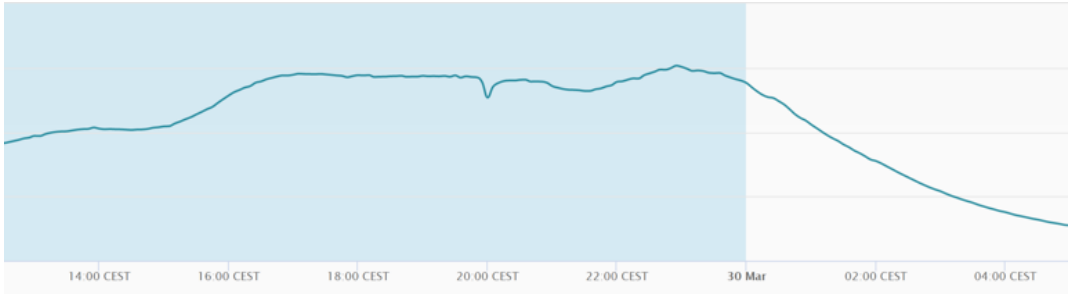


Network impact of flash events

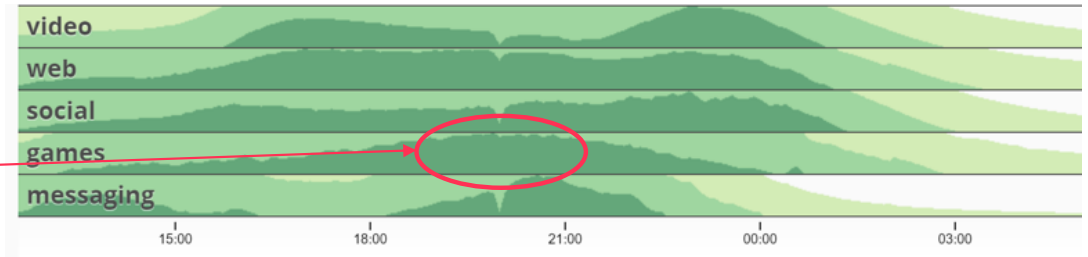
8 pm clapping in support of health workers

10%

decrease in network traffic…



…as most online activities are paused – but…
“gamers gonna game” ☺



Disney+ launch

Disney+ launched in several European countries on March 24

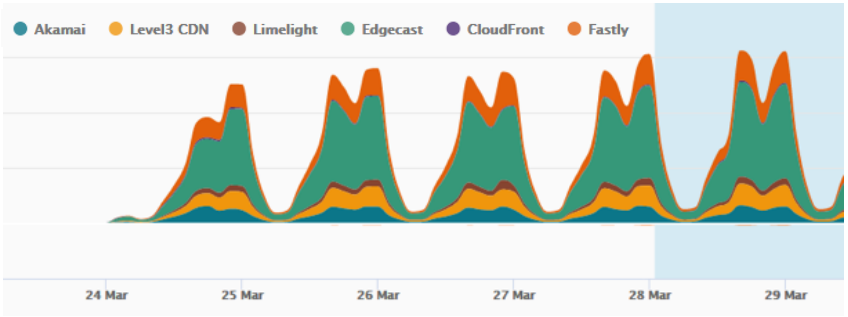
While still in the early days after the launch, Disney+ created unique challenges:

All content is sourced from peering since there is no dedicated caching infrastructure within the service providers' networks

Disney+ leverages **6 different CDNs** to source content and has the potential to cause traffic shifts (as traffic is dynamically balanced amongst CDN providers)

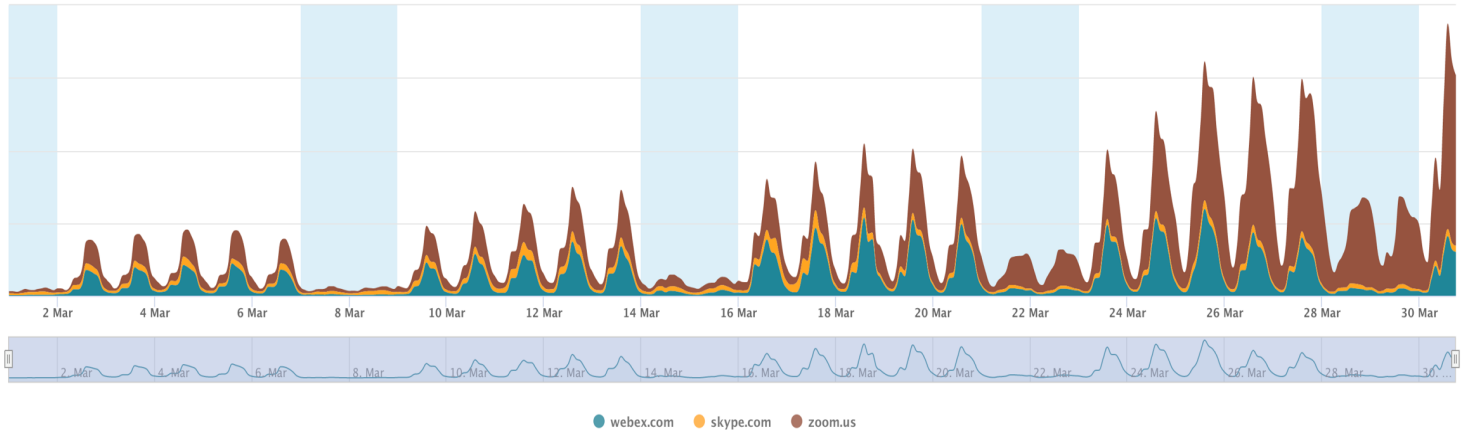
Disney+ now represents 8% of total video traffic...

...but 18% of video **peering** traffic



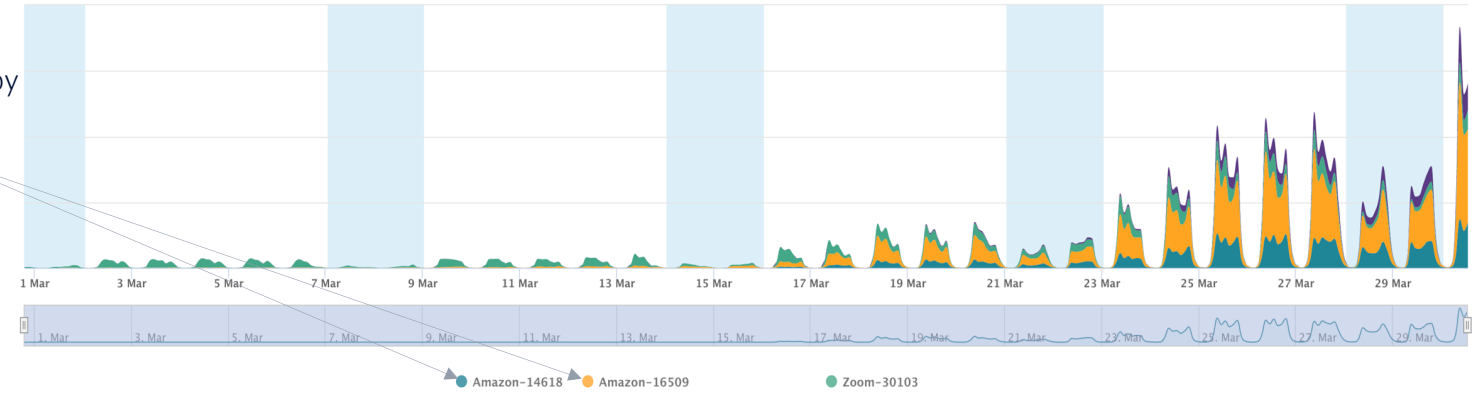
Videoconferencing growing 300%-400% initially
...and over 700% in some networks

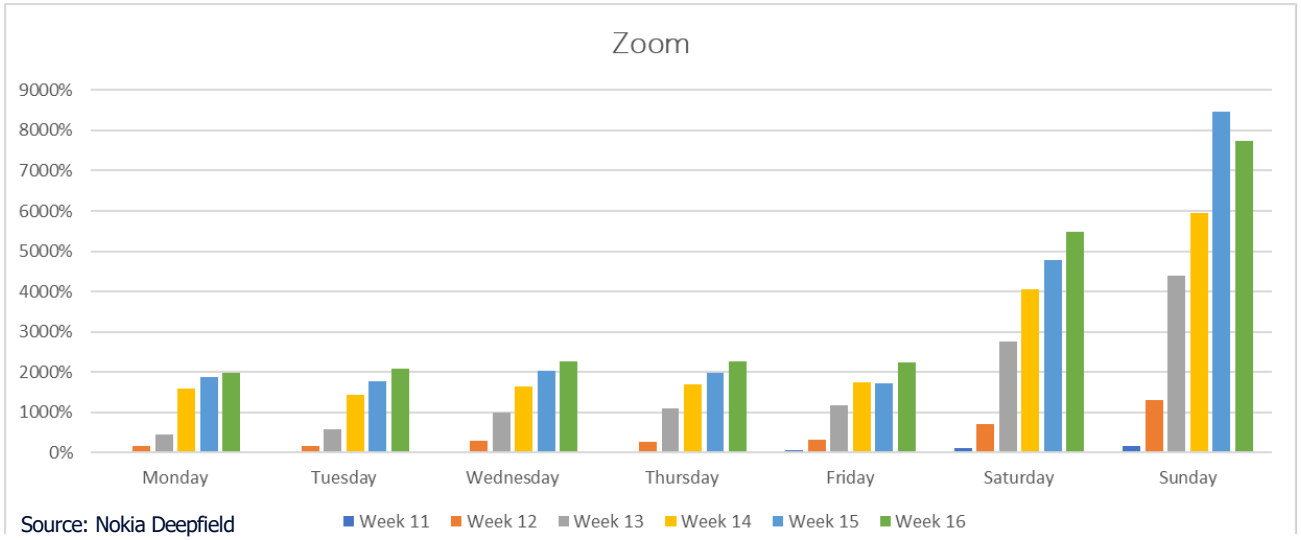
- Dramatic growth in conferencing applications
- Zoom has experienced growth over 700% since February 1 (select networks in the US)



Cloud coming to the rescue:

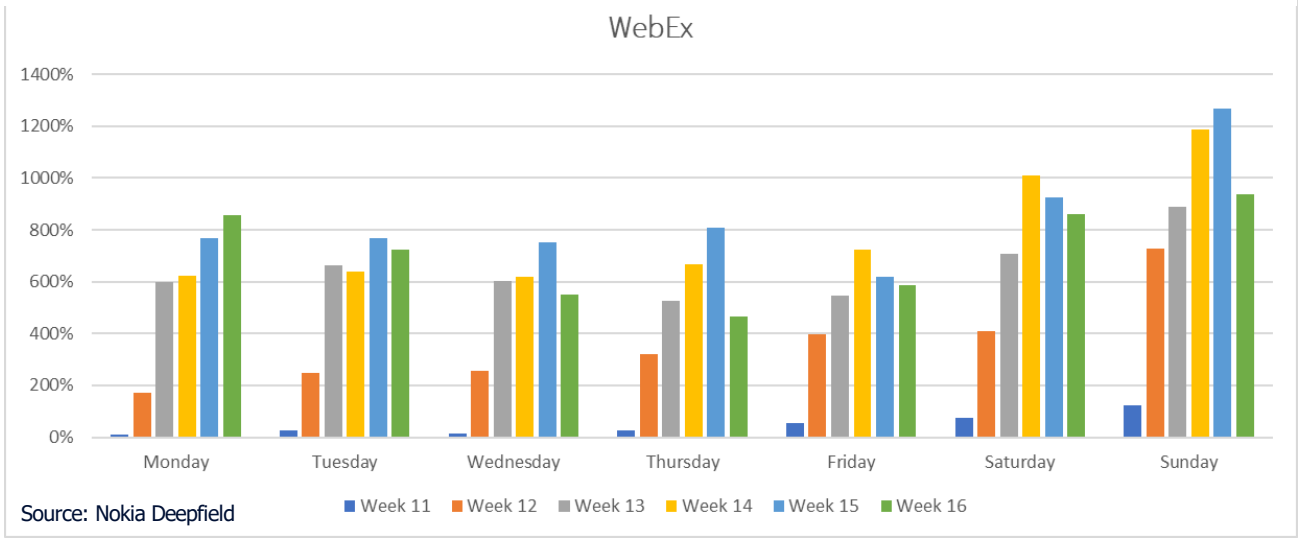
- Significant uptake of Zoom traffic by additional CDN domains (Amazon) for **multi-CDN delivery** of Zoom services





Source: Nokia Deepfield

Total daily traffic volume as compared to the same day of the week 10 (first week of March) and averaged across US and EU networks



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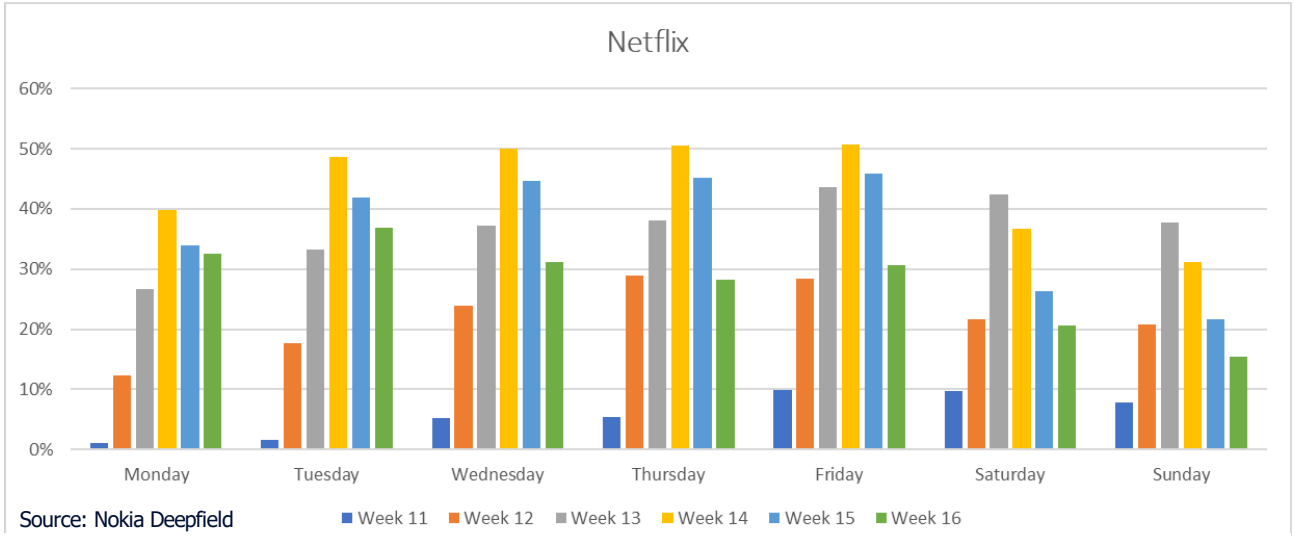

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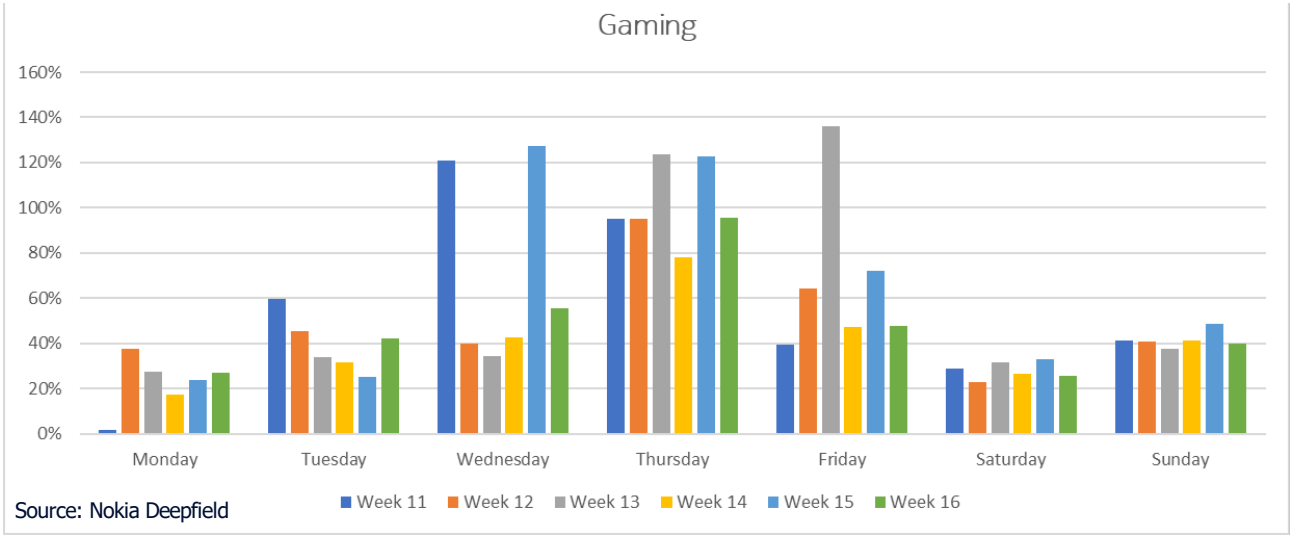

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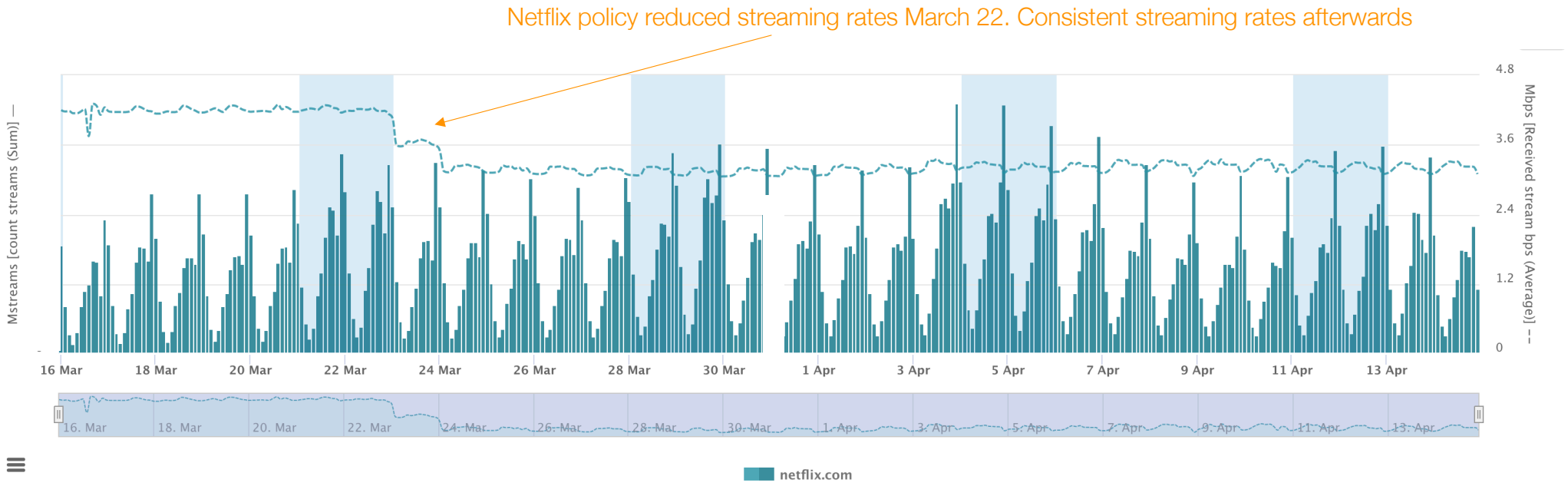
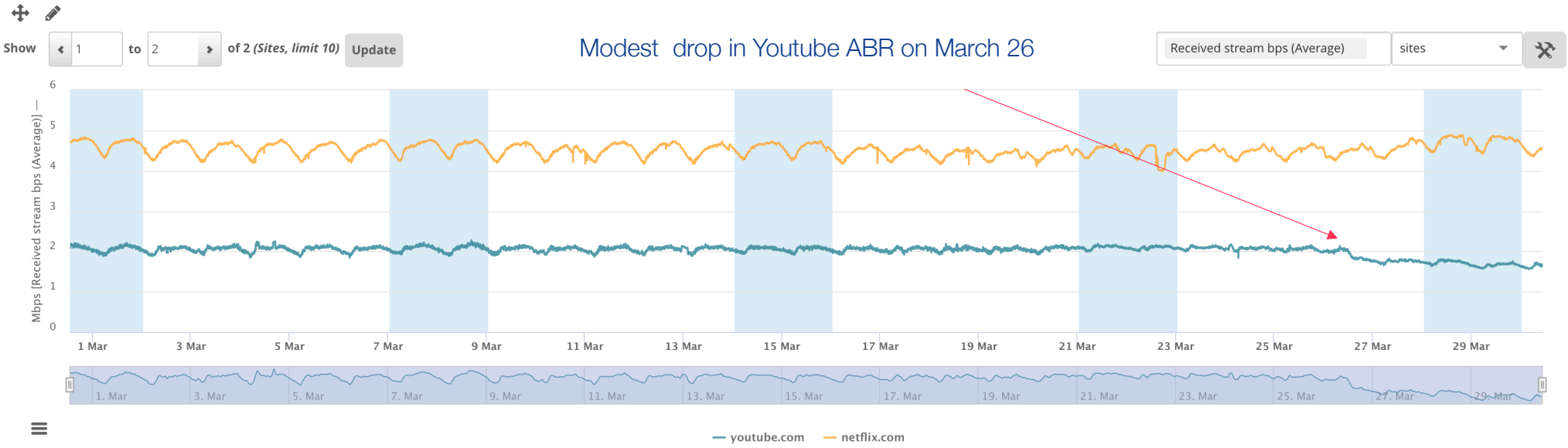
Video QoE Consistent

With exception of explicit policy changes / defaults

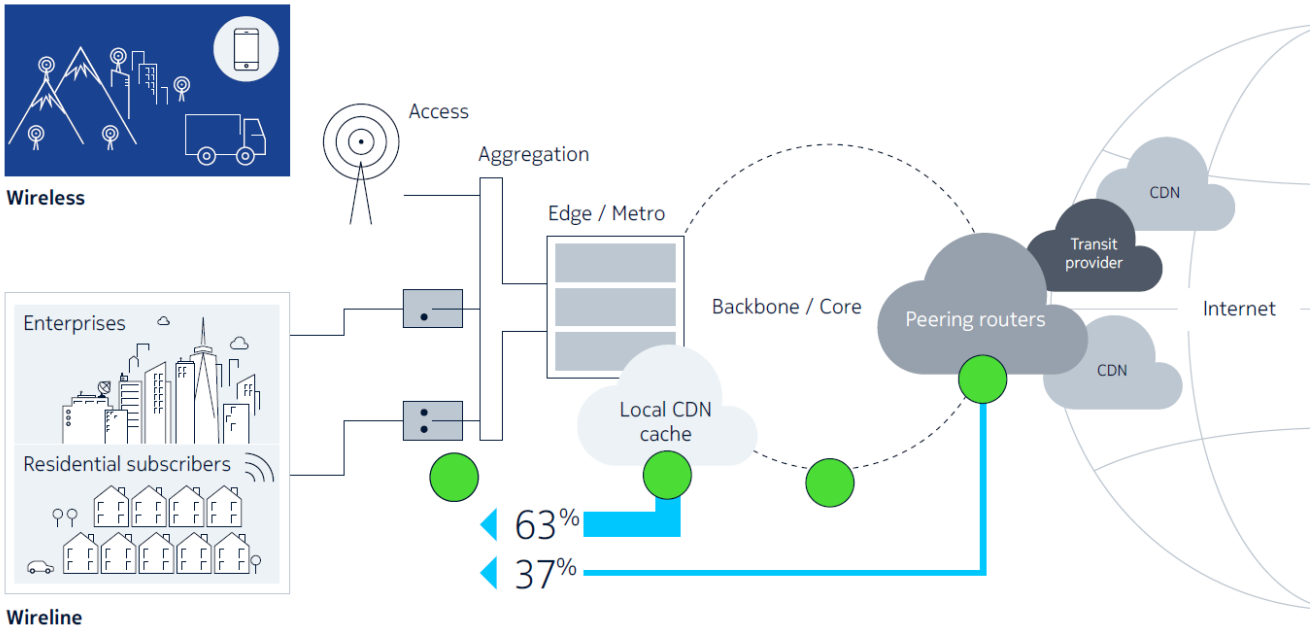


- Top line is average per subscriber stream rate for Netflix
- Columns are number of simultaneous Netflix streams

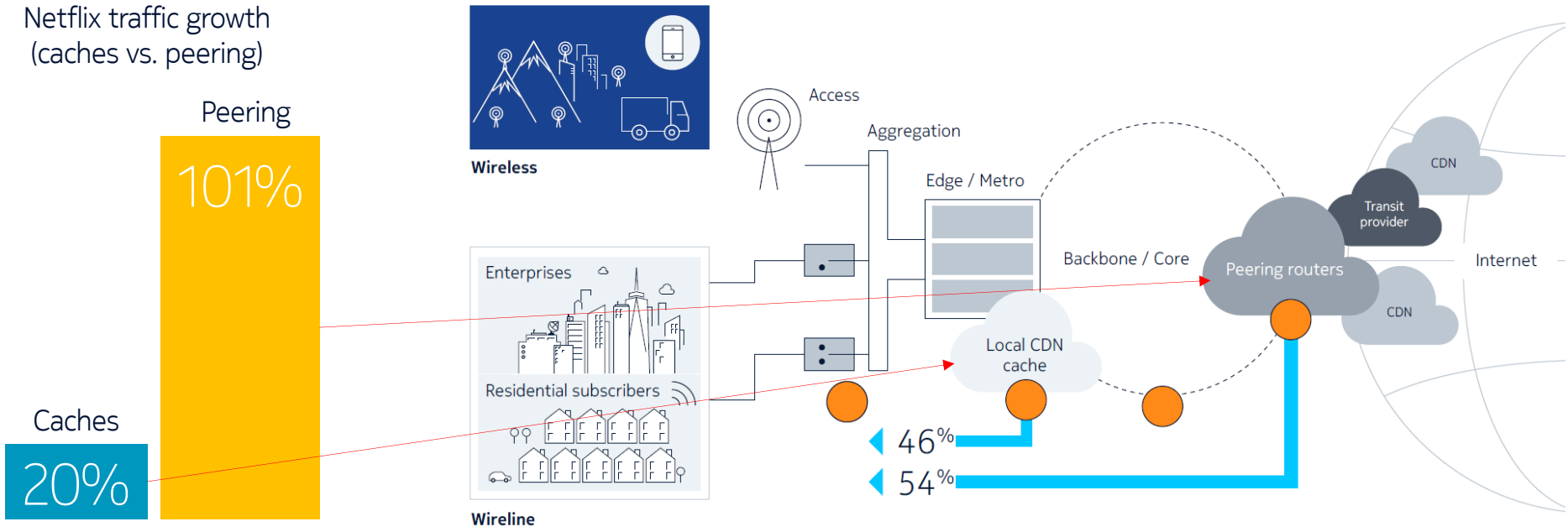
Modest drop in YouTube in US
But Netflix stream rates unchanged



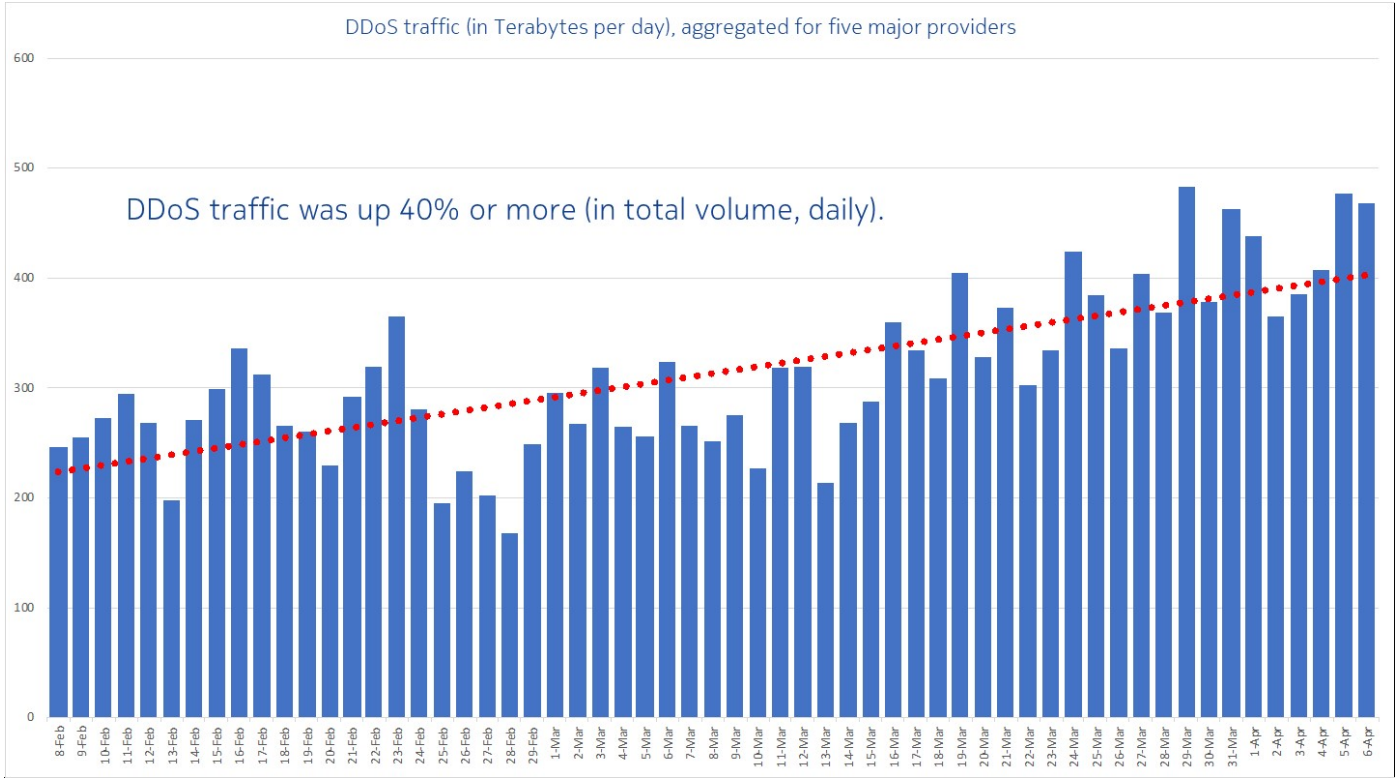
Netflix service delivery (CDN + off-net = via peering)
Before lockdown



Netflix service delivery (CDN + off-net = via peering)
After lockdown



Impact on network security
DDoS traffic in the time of COVID-19



REF https://www.nokia.com/blog/network-traffic-insights-time-covid-19-april-9-update/

Questions