

The Lockdown Effect: Implications of the COVID-19 Pandemic on Internet Traffic

A measurement perspective on ISPs, IXPs, edu network

Lots of data, lots of data crunchers



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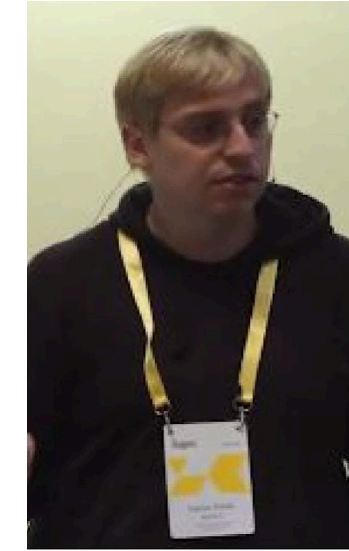
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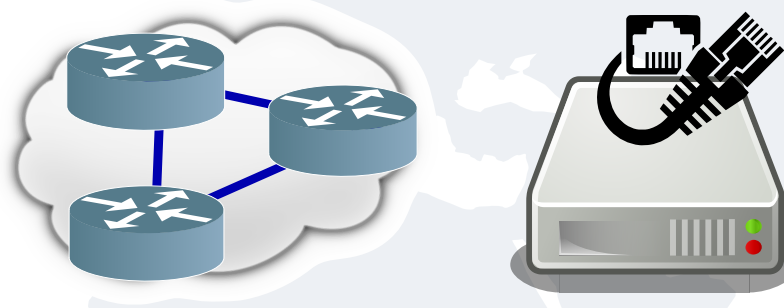
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Vantage Points

3 IXPs

IXP Central Europe
IXP Southern Europe
IXP US East Coast

Interconnecting networks



ISP

Central Europe
Residential customers
working from home

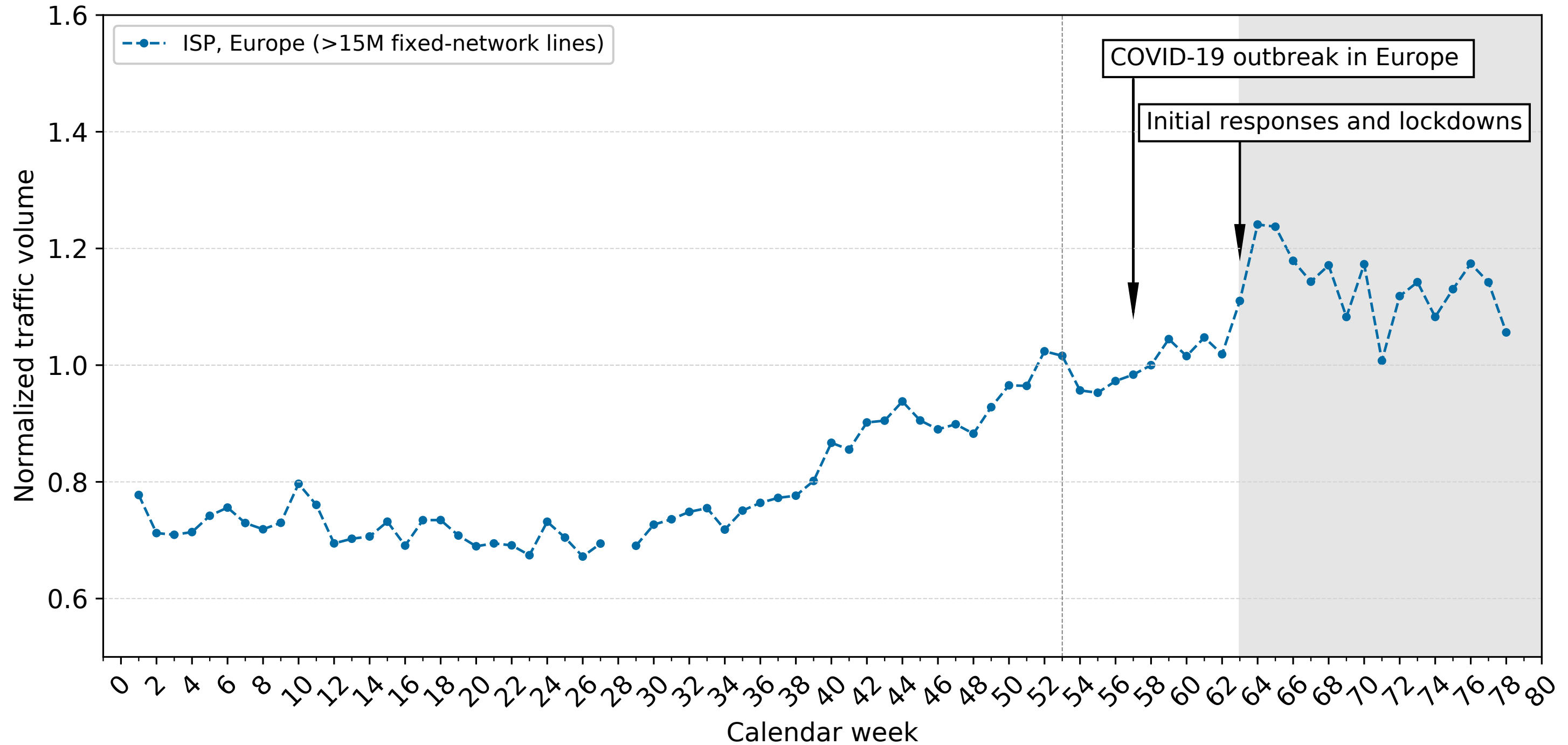


EDU

Madrid region

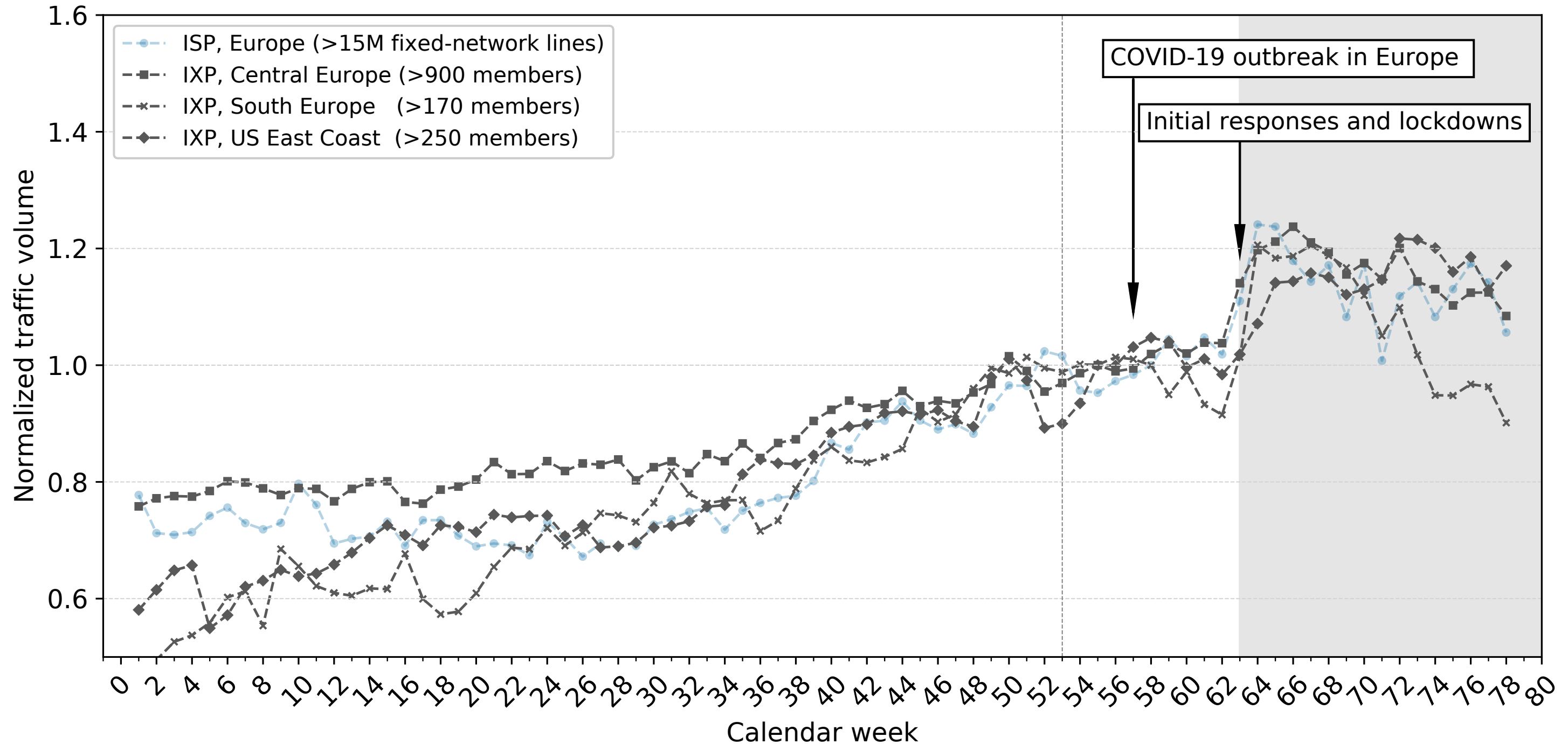
Service network interconnecting
universities and research institutions

Traffic changes: January 2019 to June 2020



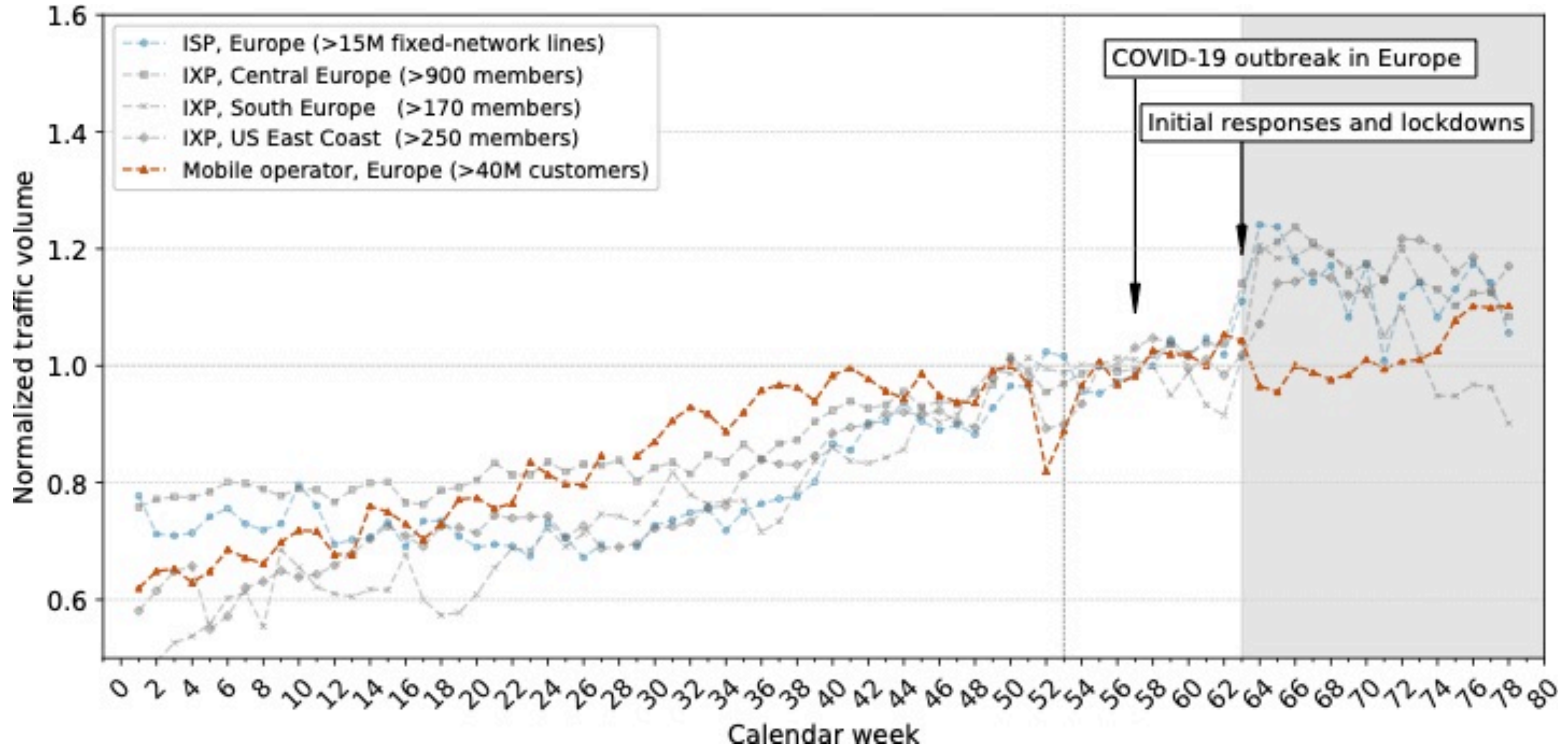
Once the lockdown started the ISP saw an increase in traffic which normally spans over multiple months.

Traffic changes: January 2019 to June 2020



**Similar behaviour for the IXPs;
for the IXP CE and IXP US the traffic levels stayed elevated.**

Traffic changes: January 2019 to June 2020



Once the lockdown started mobile traffic decreased measurably and increased as relaxations started in mid April.

People change → traffic changes

- ▶ Changes in people's lives lead to **new traffic patterns**
- ▶ Difference between **workday and weekend vanishes**
- ▶ **Traffic shift**: Applications for remote work, education, VPN, and video conferencing see significant increase in traffic
- ▶ Educational network: **Absence of users can lead to decrease in traffic**
- ▶ Many of the relevant applications are not served by hypergiants
 - → only focusing on hypergiants may not suffice

We find, that the human behavior change caused by the COVID-19 pandemic are directly reflected in changes to Internet traffic patterns.

People change → traffic changes

- ▶ Traffic increase of 15-30% within a few days
(Networks usually provision for ≈30% increase per year)
- ▶ Impact on peak traffic is limited, but **valleys get filled**
- ▶ The CE IXP reports capacity increases of 1,500 Gbps
- ▶ Networks did **react quickly** to the additional need for capacity

Networks can accommodate sudden changes in demand if they're planned with spare capacity and quick reaction times.