



ATLANTA, GA
OCTOBER 11-14

SCTE
a subsidiary of CableLabs®

UNLEASH THE POWER OF LIMITLESS CONNECTIVITY



**2021 Fall
Technical Forum**
SCTE • NCTA • CABLELABS



SCTE
a subsidiary of CableLabs®

Operational Transformation

What It Takes to Automate Operations at Scale: Coupling Strategic Growth Analytics with Automated Methods for Real-Time Scalable Network Planning

Richard Brown

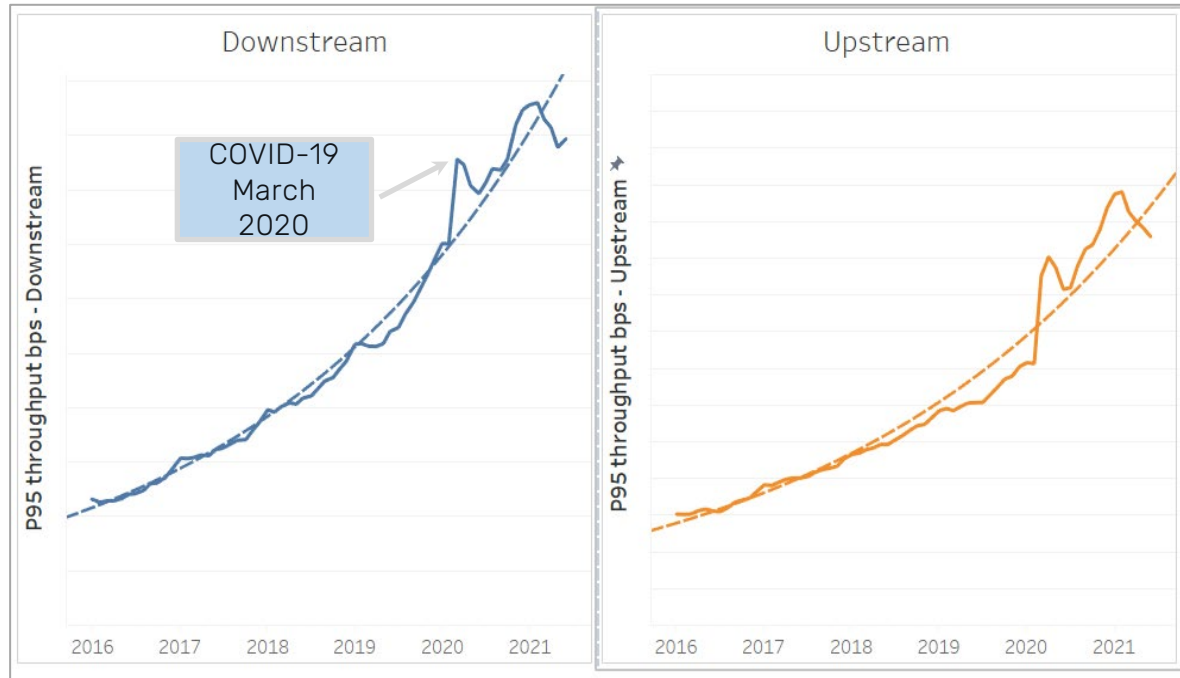
Why Do we need Scalable Automated Solutions

- Access network growth drives most network planning
- Customer increasing needs for BW
- Data sets keep growing
- Supply Chain and Field teams need Adequate lead times
- Complexity of Solutions harder to track
- Need to include E2E view of Entire network
 - Backbone, Metro, Transport, Access, Business



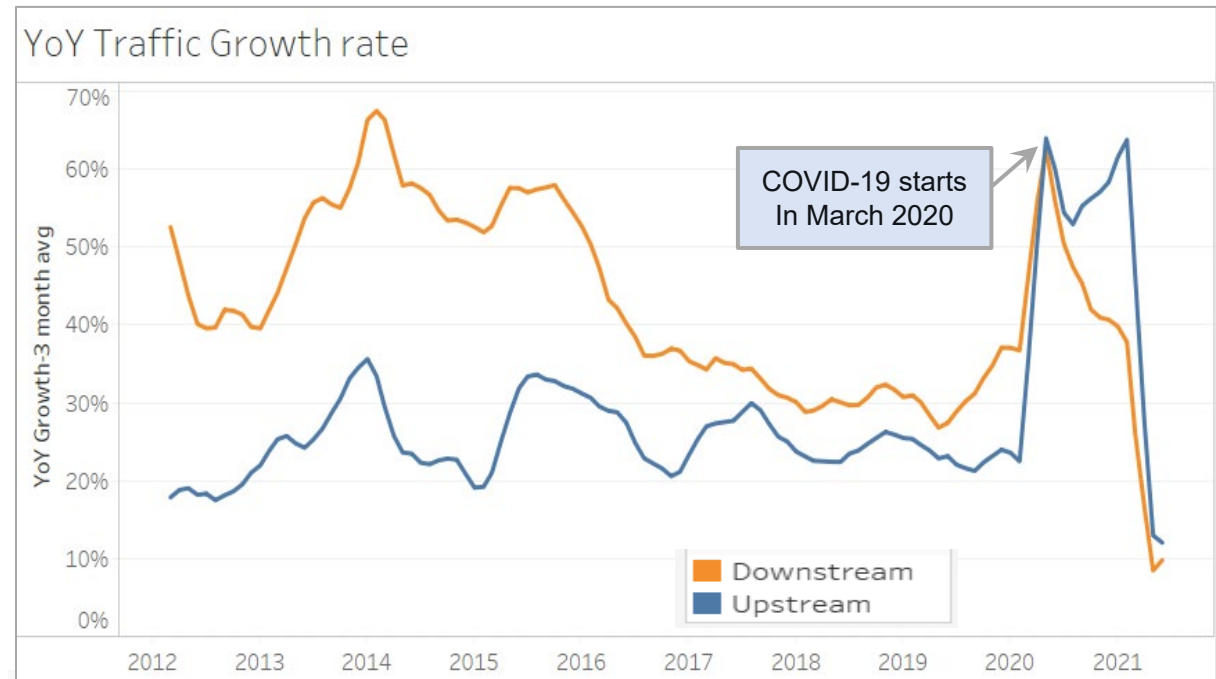
Growth Rates

CMTS P95 Traffic Growth



- Aggregated 95th percentile peak traffic has increased exponentially

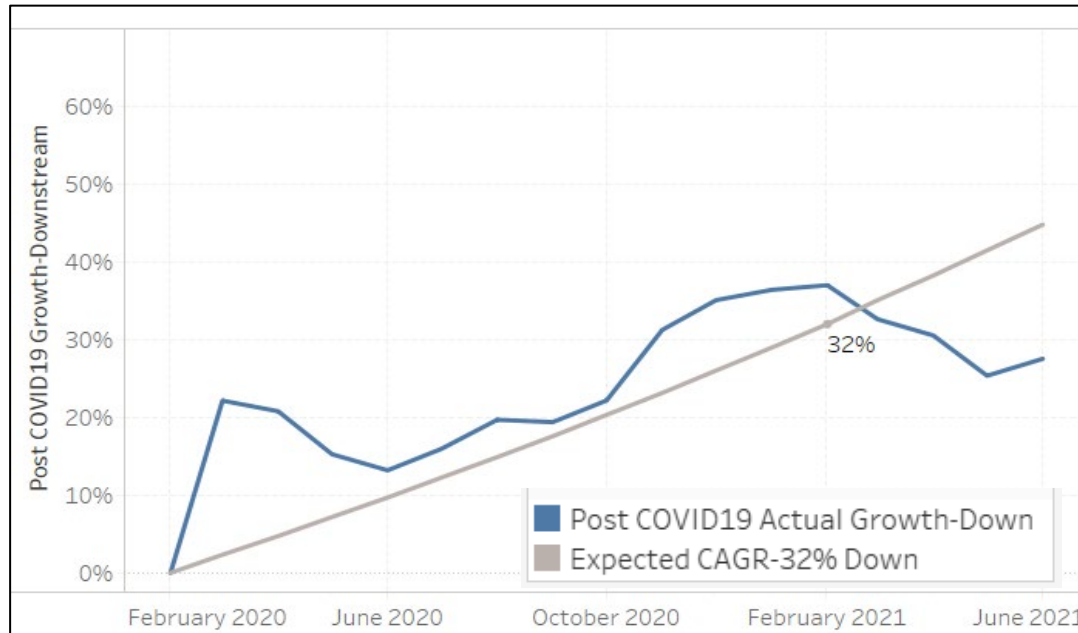
YoY Traffic Growth Rate



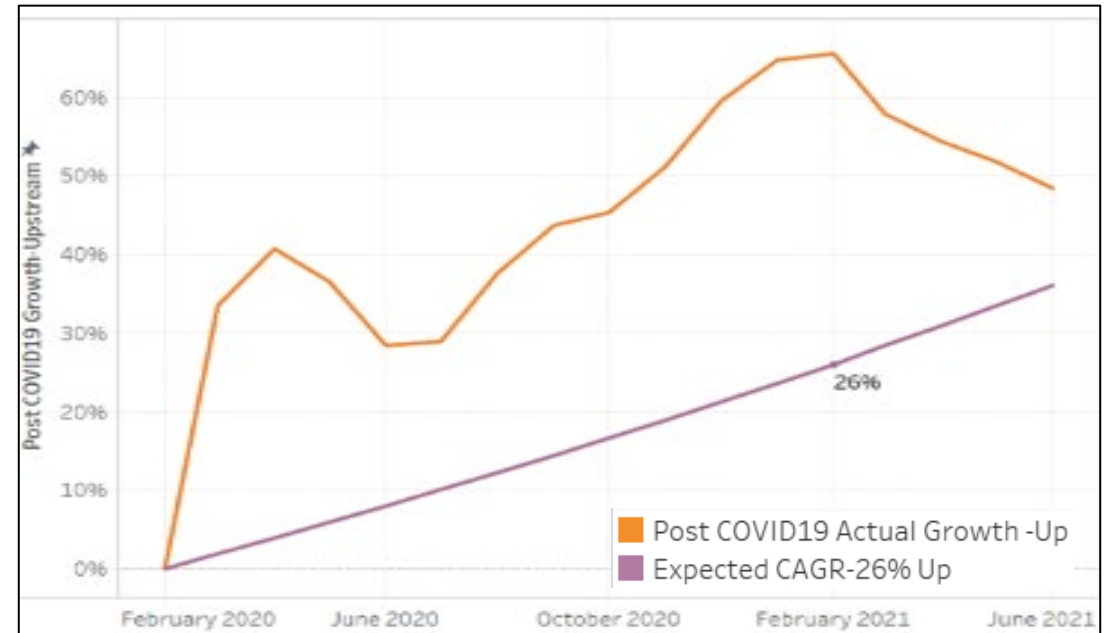
- Netflix re-encoded its entire catalog in early 2016
- Since COVID-19, Upstream growth rate is higher than downstream

Post COVID: Actual vs Expected Growth

Downstream

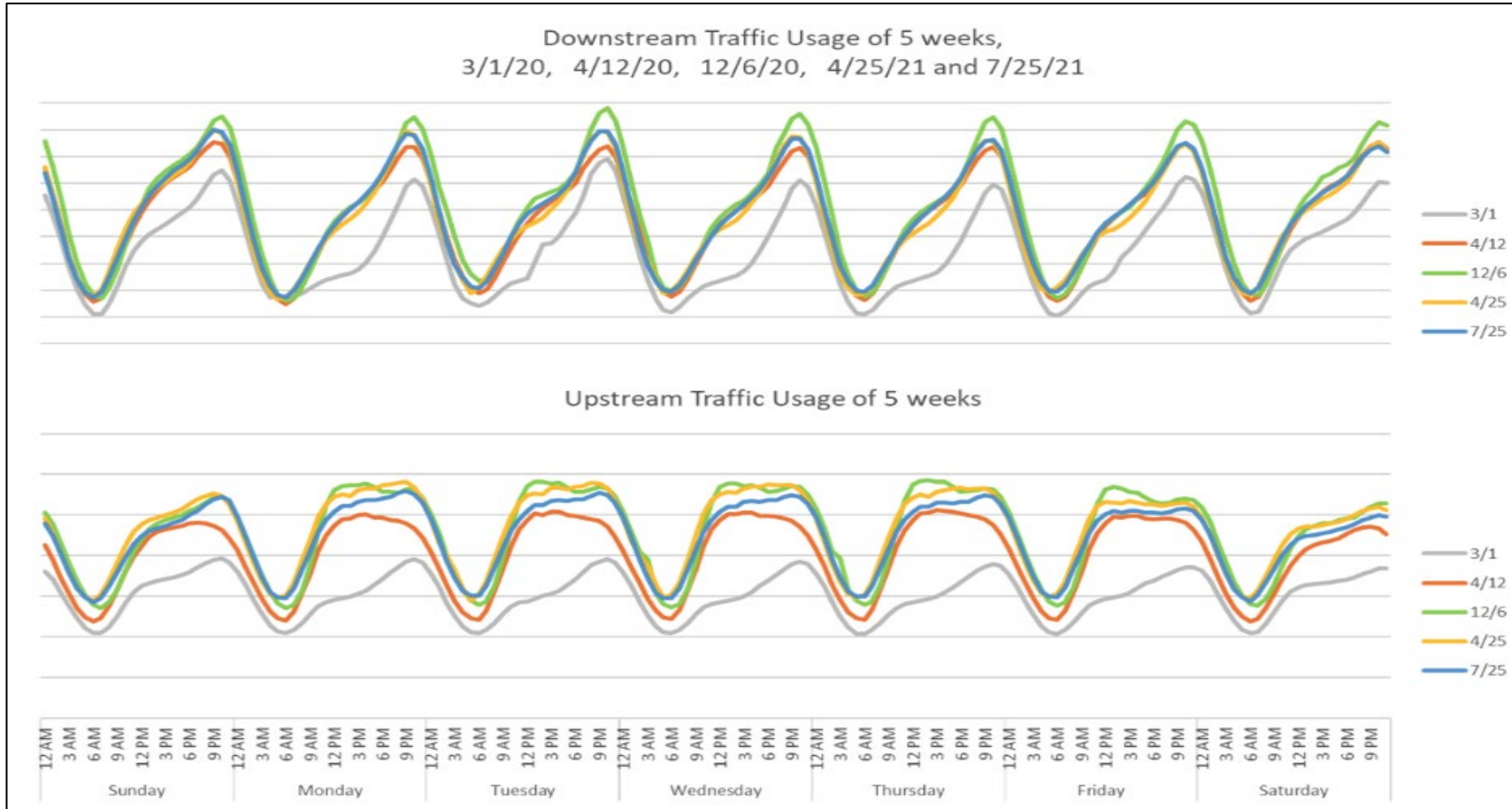


Upstream



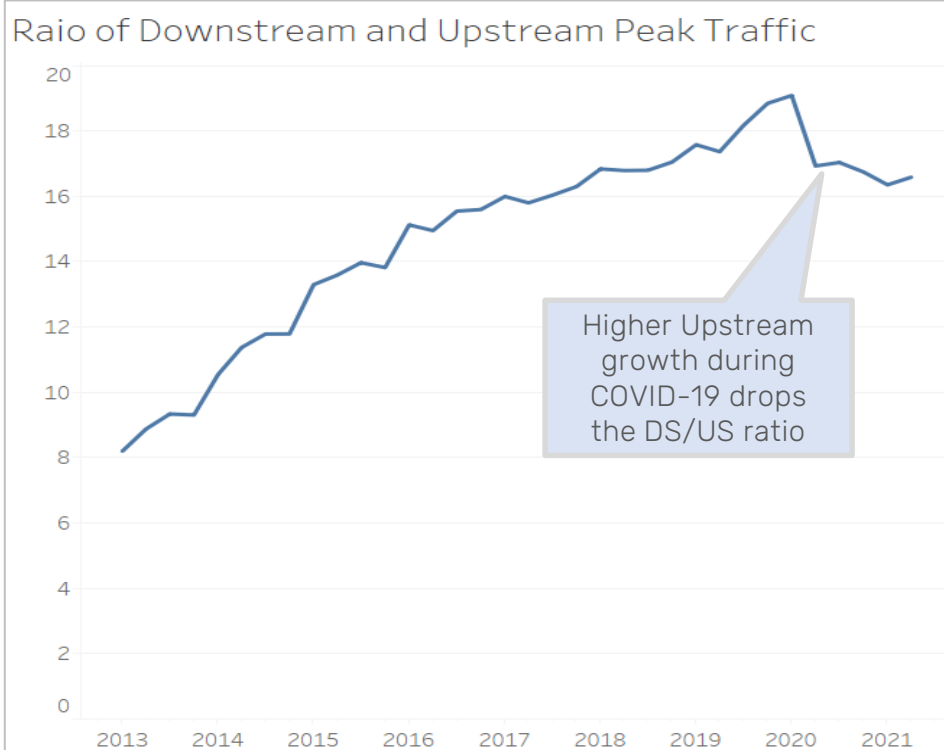
- Peak hour usage increased relative to Pre-COVID-19 in Feb 2020
- Upstream traffic continues to show in higher growth. The recent trend shows about 15% point above historical YoY growth rate
- Recent downstream growth rate is smaller than the historical growth pattern

Hourly Peaks (p95)

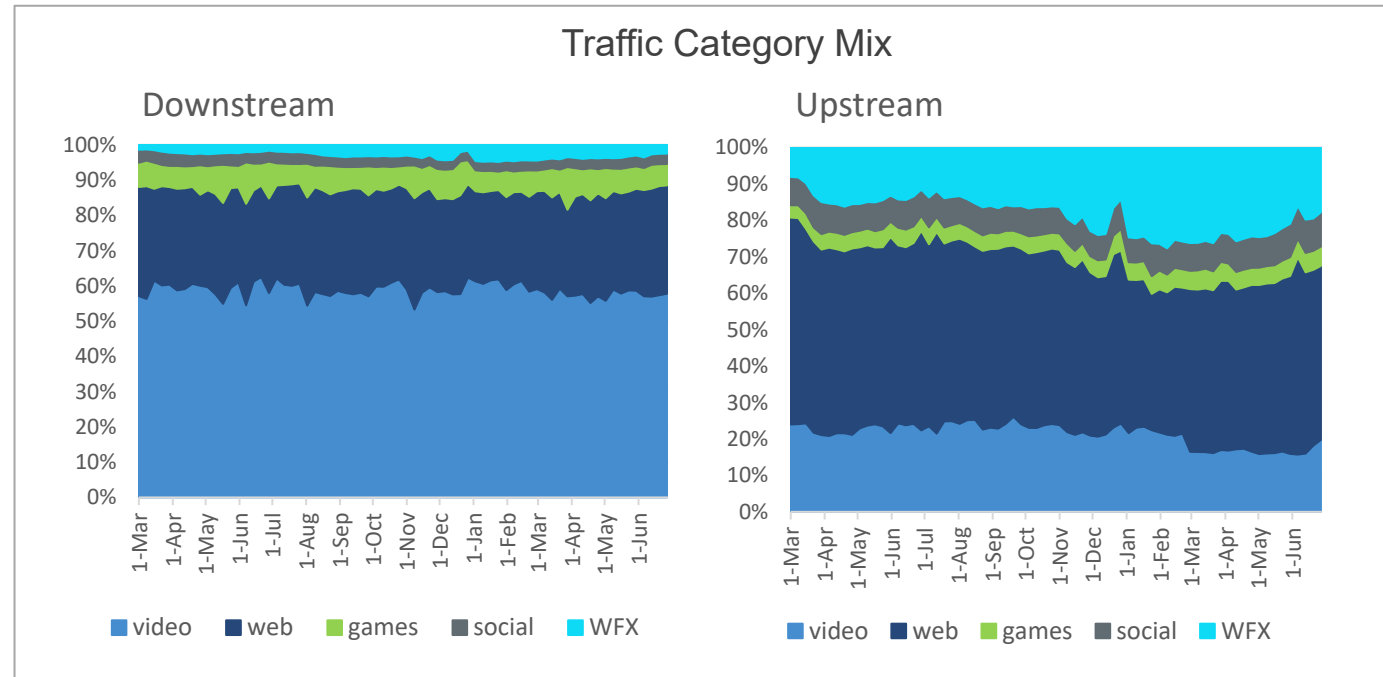


- Hourly usage pattern of the 5 sample weeks
- Upstream peak hours have shifted to the daytime during COVID-19. Recently it has returned to the late evening time, but there is still heavy usage during daytime
- Downstream peak hour and usage pattern has not changed during COVID-19

Traffic Ratio and Mix



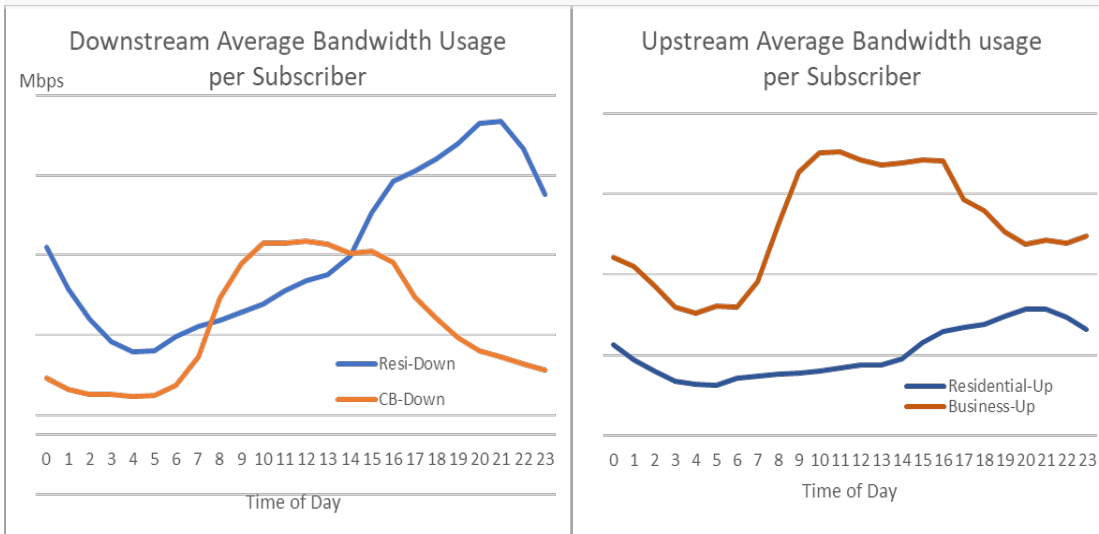
- Peak traffic ratio of DS to US has grown up to almost 19:1 since DS traffic growth rate is higher. It drops to 16:1 during COVID-19.



- Significant increase in Work From Home, and moderate increase in Video, Web, Gaming and Social during COVID-19.
- WFH increased up to 400% from Mar 2020. It went down to 150% recently
- The overall traffic remains dominated by Video and Web
- Peak usage growth is still driven by traditional drivers, such as OTT video

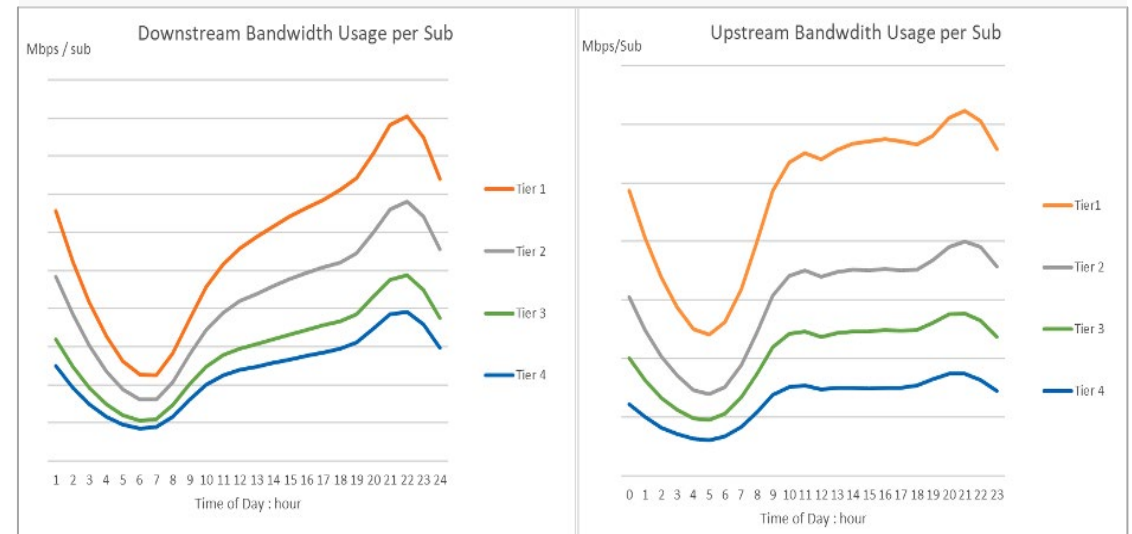
Bandwidth Usage

Average usage pattern of Residential vs Business customer



- Business customers' usage peak hours are 10am to 4pm, while residential peak hours are 7pm to 10pm
- Business customers consumes less downstream and more upstream than residential customers
- Business customers' usage ratio of DS to US is 5:1. Residential customers' ratio is 16:1

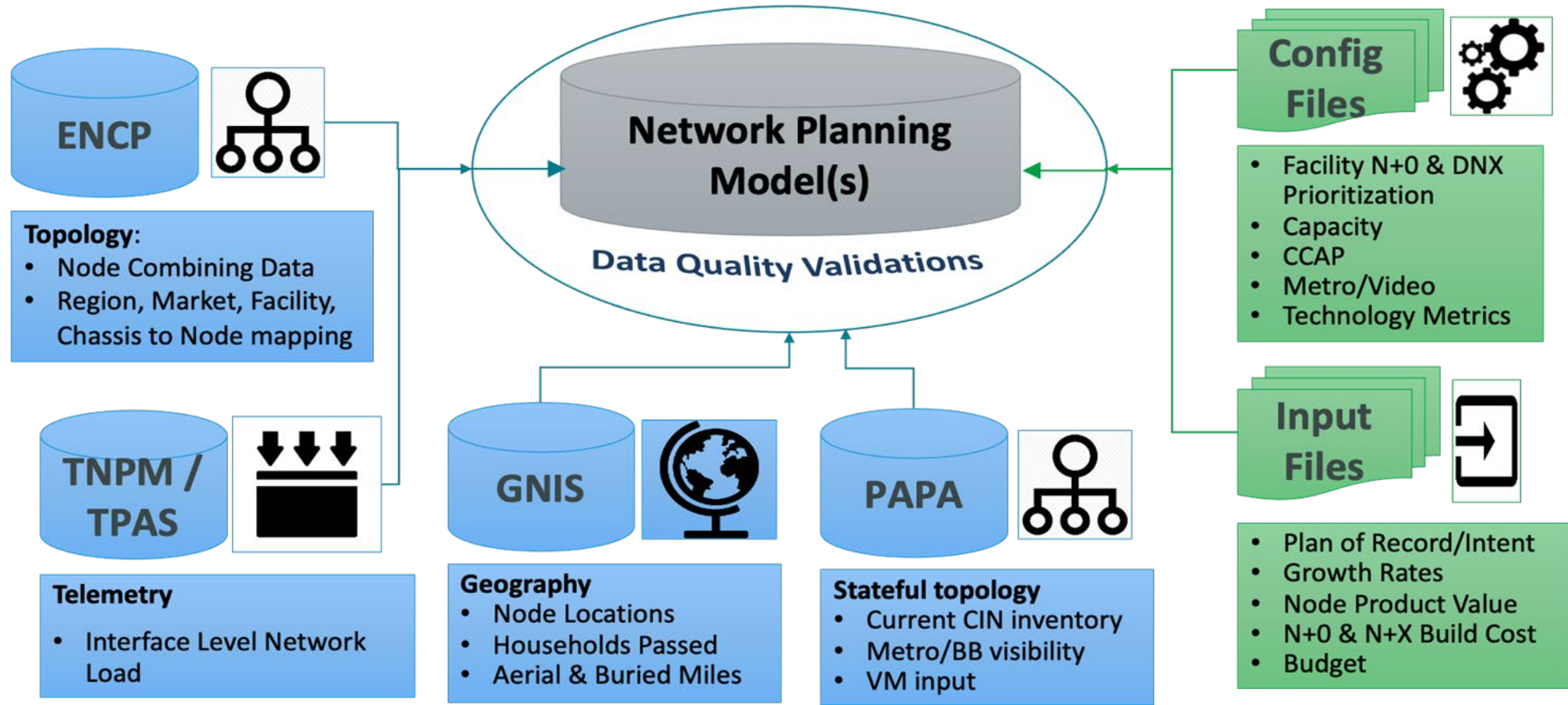
Average usage pattern of different speed tiers



- Usage patterns are quite similar across different speed tiers.
- Higher speed tier consumed more bandwidth, but not proportional to the maximum speed they can use.

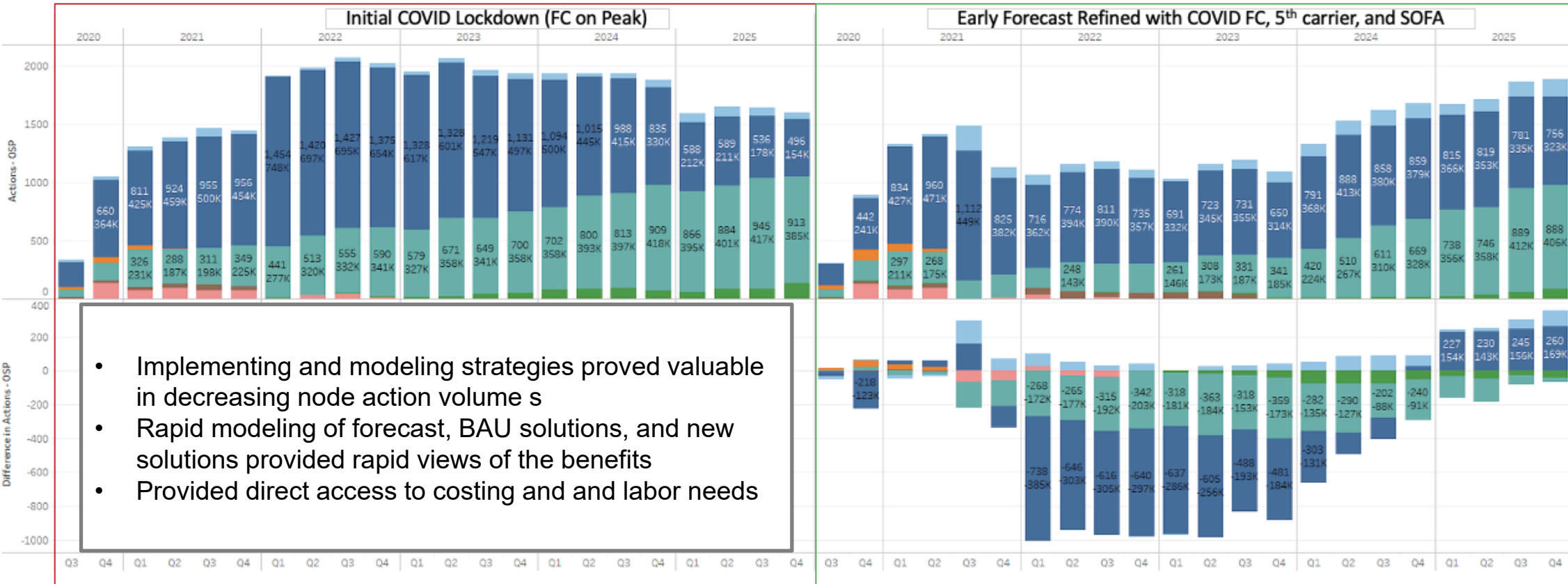
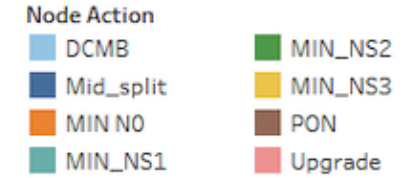
Automated Planning Tools

The Access Model pulls in 15+ data sources from various inputs and applies various data quality validations on insert.



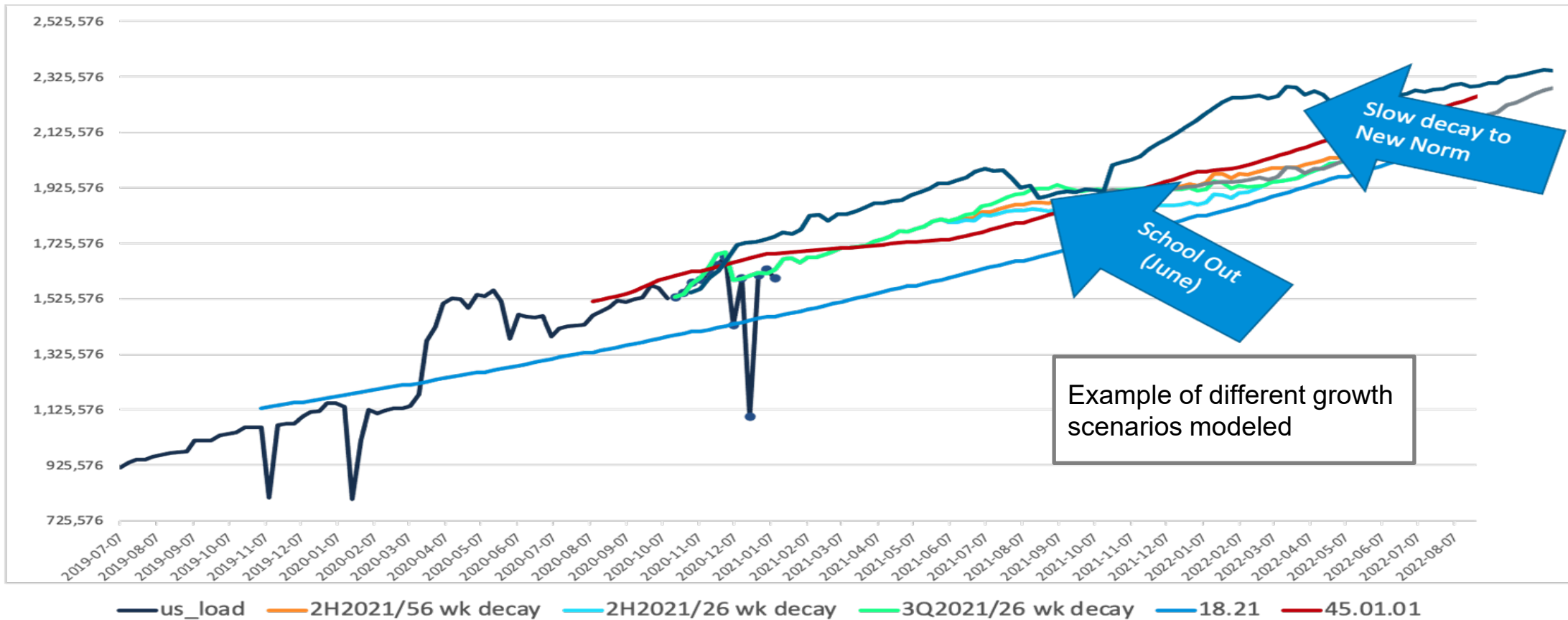
Addressing the Congestion with Innovation

Modeling new Solutions



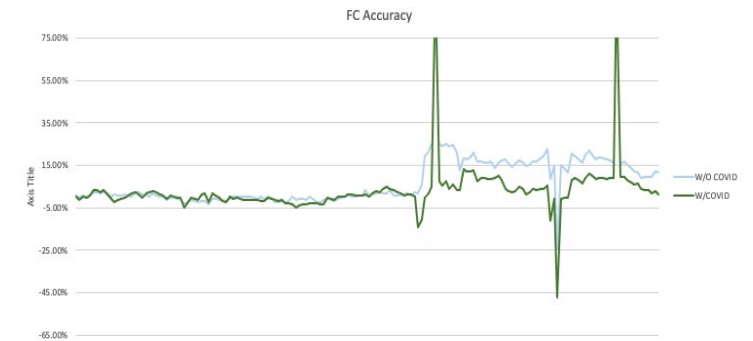
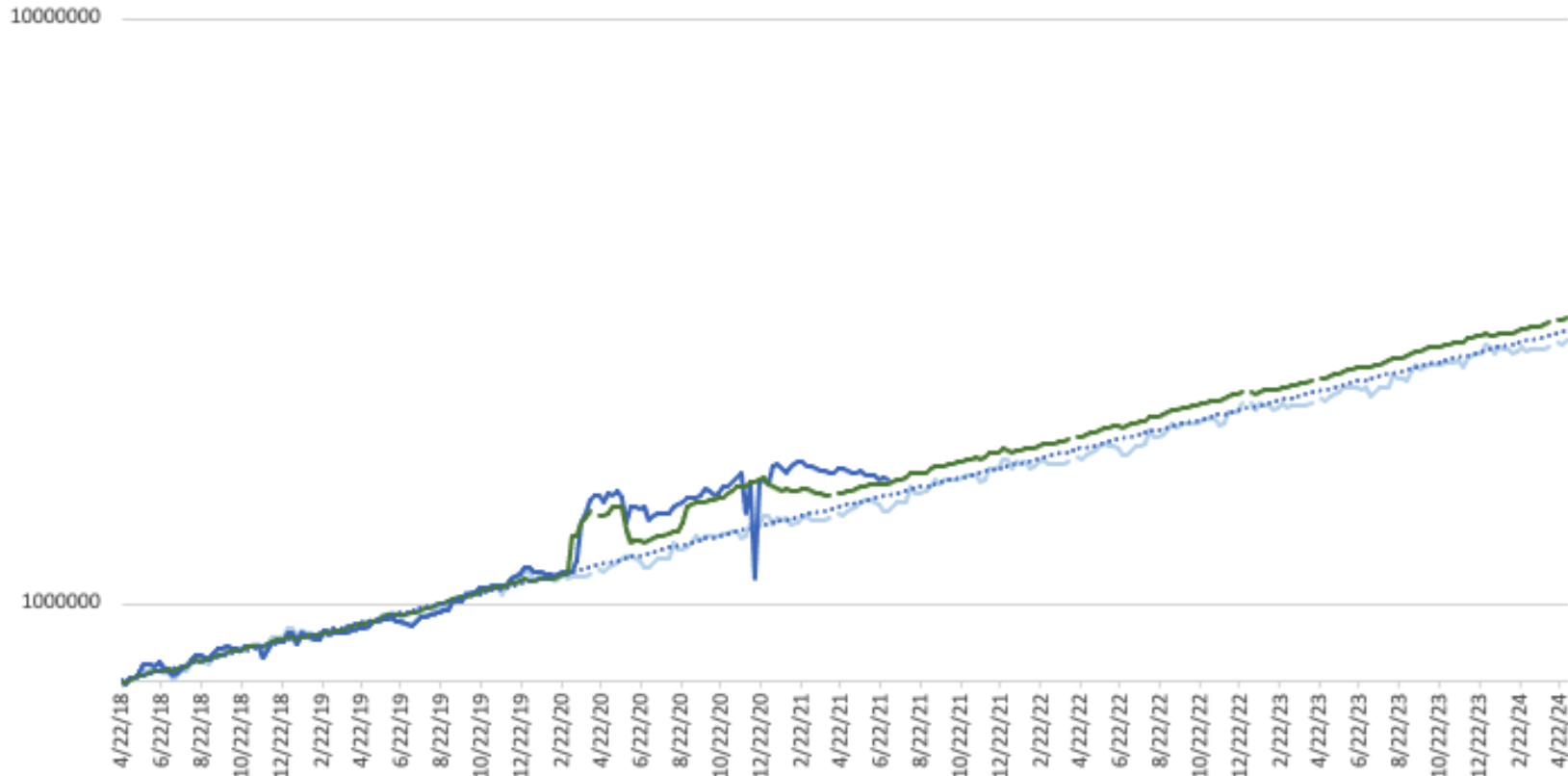
- Implementing and modeling strategies proved valuable in decreasing node action volume s
- Rapid modeling of forecast, BAU solutions, and new solutions provided rapid views of the benefits
- Provided direct access to costing and and labor needs

Deploying Forecasts and Scenarios



Early Forecasting of COVID Impacts

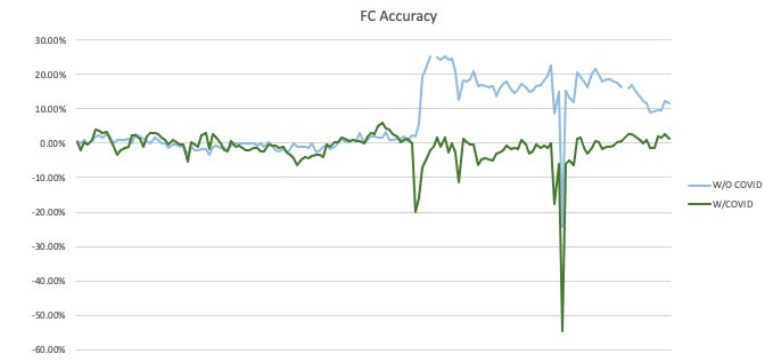
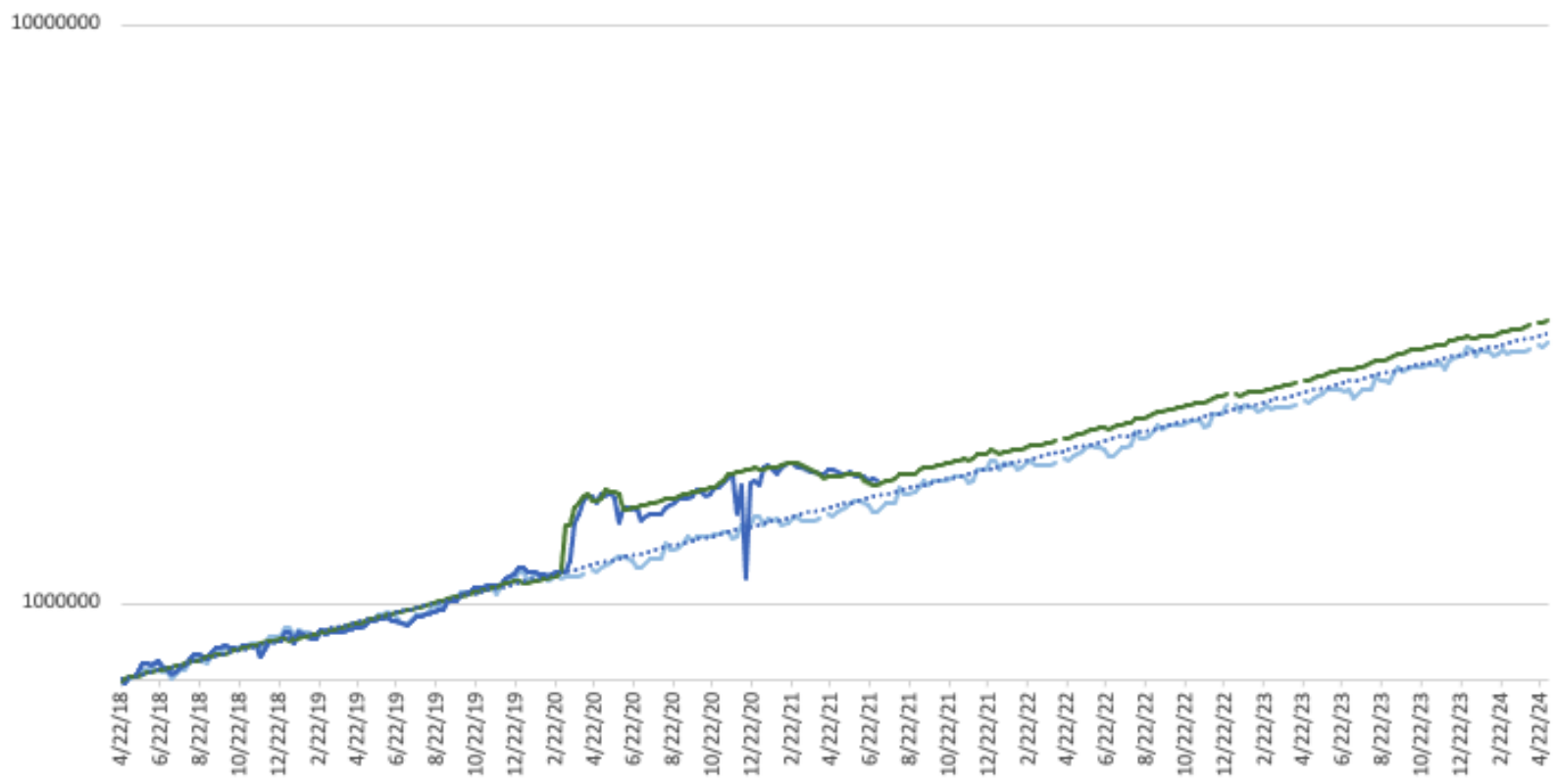
First Pass COVID Forecast



- Heavy blue line actuals
- Log-linear scale
- From the first forecast, was able to model closer to COVID, but still a lot of error
- There were many iterations, sometimes with weekly runs to update and analyze actuals

Adapting and adjusting based on Actual Outcomes

Final Pass COVID Forecast




- Heavy blue line actuals
- Log-linear scale
- As time passes, the forecasts accuracy increases
 - Accuracy measured based on holdout accuracy
- Still maintaining a “New Normal”**


Wrapping it up





Value Oriented

Change History


Time


People


Process


Tool

	Time	People	Process	Tool
Prior State	3-4 weeks access	4-5 people	10-20% error rate	Excel not scalable
Current State	< 15 min	Push Button	Precision in decimals	Big Data Platform

Hundreds of millions savings over

IP with Patent Pending presented at multiple trade-shows

Managed Service Offering Option



ATLANTA, GA
OCTOBER 11-14

SCTE
a subsidiary of CableLabs®

Thank You!

Dr. Sung-eun Kim
Sr. Network Planning Engineer
Cox Communications, Inc.
Atlanta GA, 30328
sung-eun.kim@cox.com

Richard Brown
Sr. Manager Network Engineering
Cox Communications, Inc.
Atlanta GA, 30328
richard.brown@cox.com