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Operational Transformation

Bandwidth Planning During the Age of CoVID

Keith Alan Rothschild, Ph. D.

Senior Principal Engineer
Cox Communications

2021 Fall Technical Forum
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VIRTUAL EXPERIENCE
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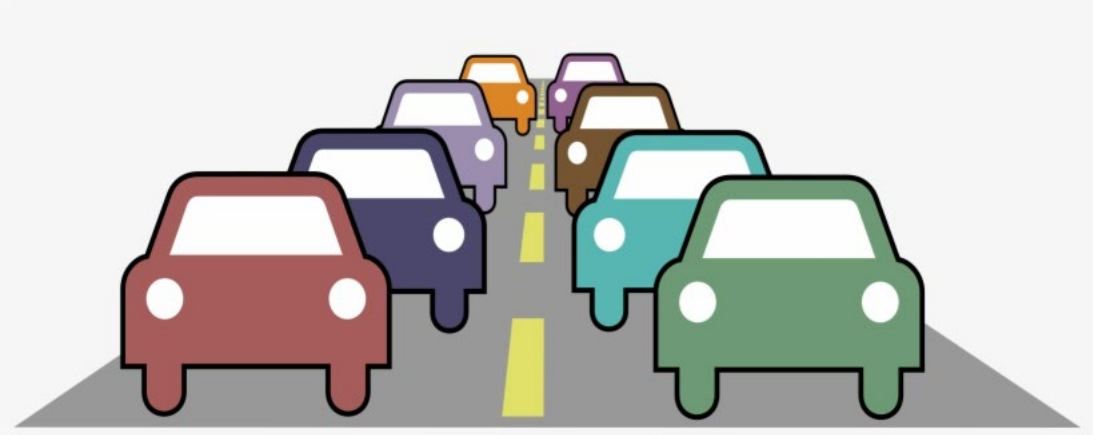
Bandwidth Planning Process

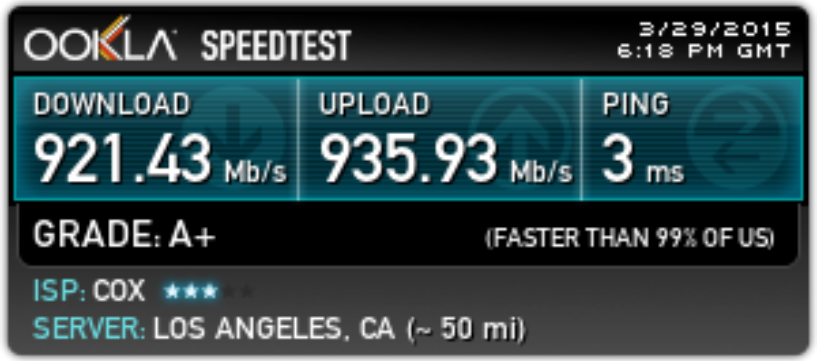
- Strategize
- Model
- Plan
- Deploy

$$\text{Required Capacity} \geq P_{95} + T_{Max}$$



Rush-Hour Traffic

+



Highest Advertised Single-Customer Speed Tier

Optimize the bandwidth we currently have:

Optimize Technologies Used for Service Offerings
Increase Efficiency (MPEG-4, OFDM/OFDMA)
Re-allocate Spectrum Between Service Offerings

Create more bandwidth:

Change Downstream to Upstream (change the "split")
Fewer Customers Share Bandwidth (e.g. Node Splits)
Increase Bandwidth Available (Upgrade)

Migration to support DOCSIS Expansion

972 MHz Sub-Split (40/54 Diplex)

Migration to Mid-Split (85/102 Diplex) – *"reduce" 7 6 MHz Channels*

Expansion to Third DOCSIS Block – *re-allocate 16 6 MHz channels + 96 MHz from trap*

870 MHz Sub-Split (40/54 Diplex)

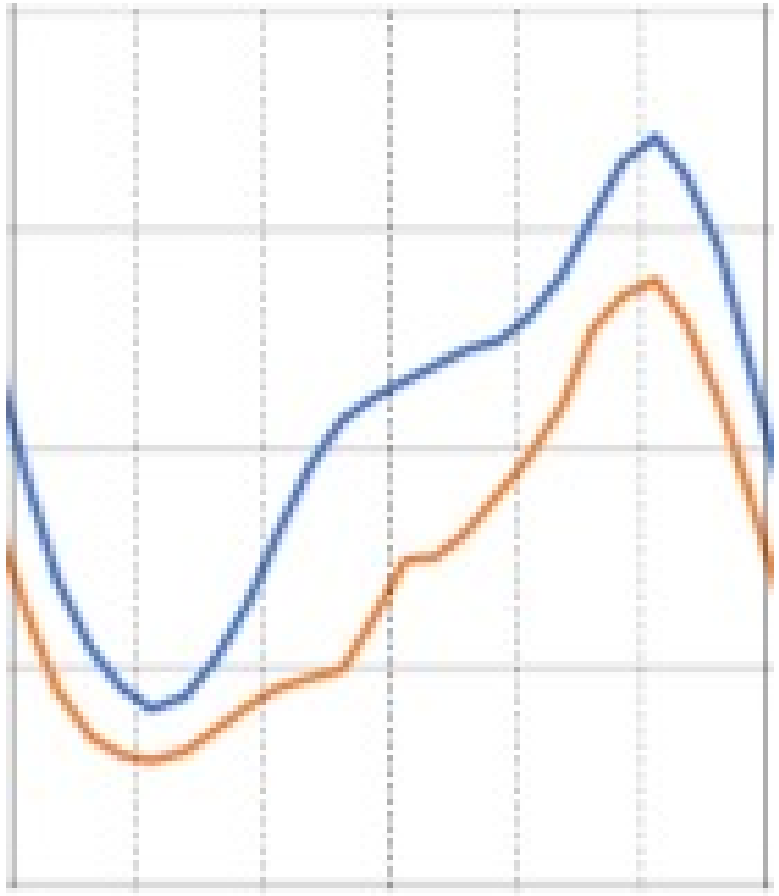
Migration to Mid-Split (85/102 Diplex) – *"reduce" 7 6 MHz Channels*

Expansion to Third DOCSIS Block – *re-allocate 16 6 MHz channels + 96 MHz into roll-off region*

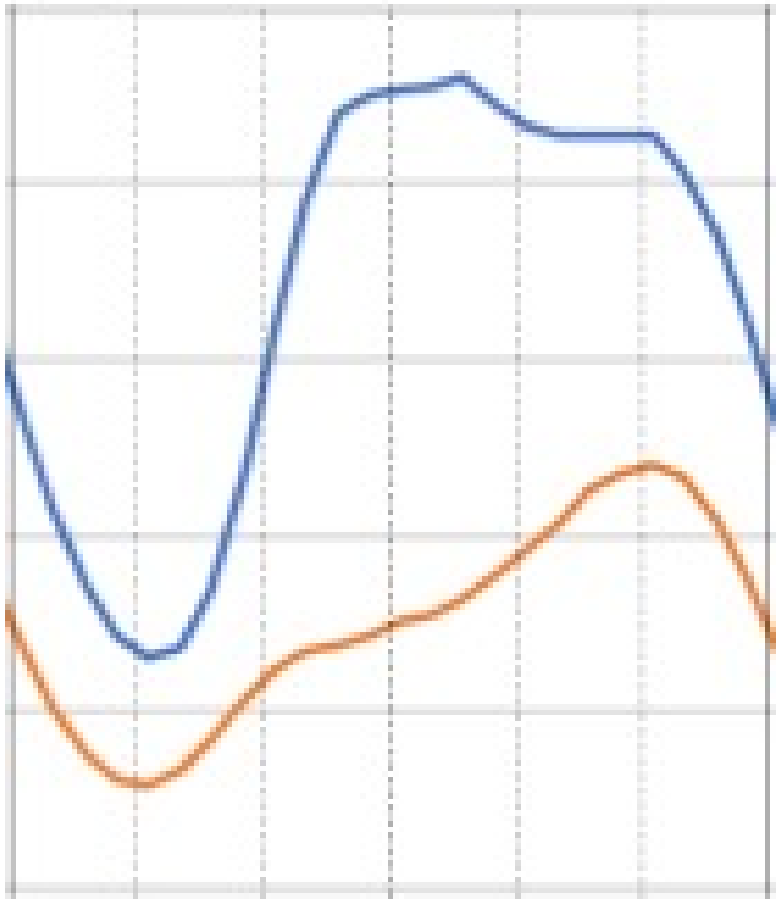
DOCSIS Expansion Required Reducing 23 Video QAMs

MPEG-2 (4:1) to MPEG-4 (6:1) results in a 33% Bandwidth Savings (69 -> 46)

Typical Weekday Bandwidth Impact



Downstream

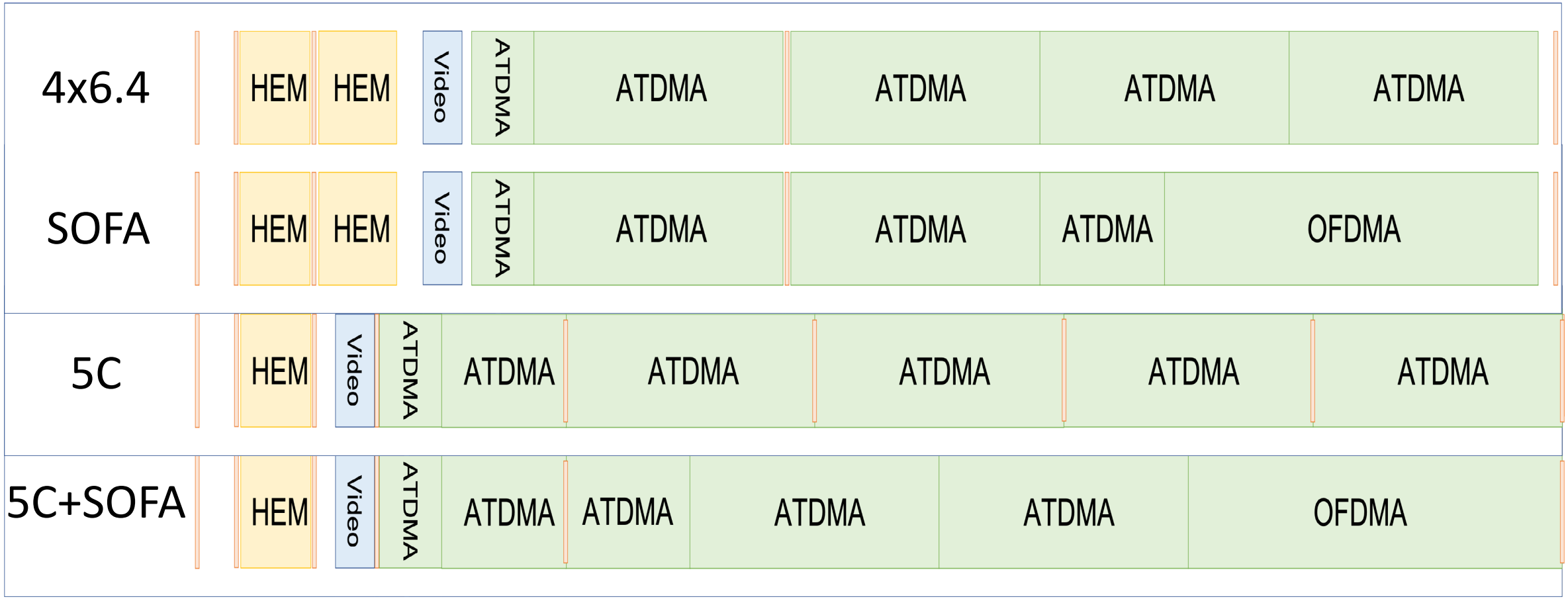


Upstream

During CoVID

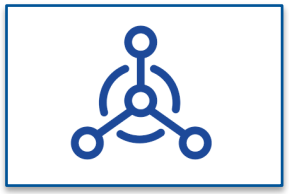
Before CoVID

SOFA and 5th Carrier

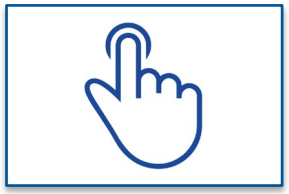


Network Planning Goals

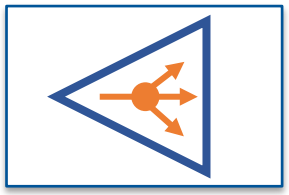
High-quality customer experience / “Congestion-free” network



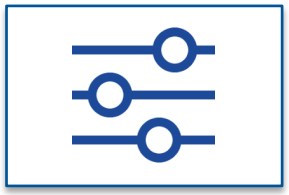
Target-state architecture / Multi-Gig symmetrical speeds



Minimize disruption during network upgrades



Leverage existing assets & minimize regrettable spend

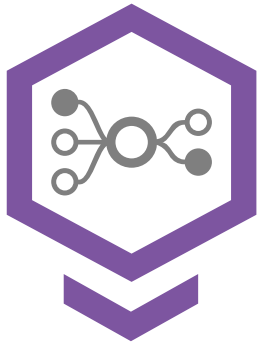


Avoid Lock-In

Modeling Considerations

Customer Demand: Cloud Storage, Video surveillance and other emerging applications are driving upstream growth.

Competition: Aggressively driving down price and accelerating the need for high-penetration Gigabit Speeds



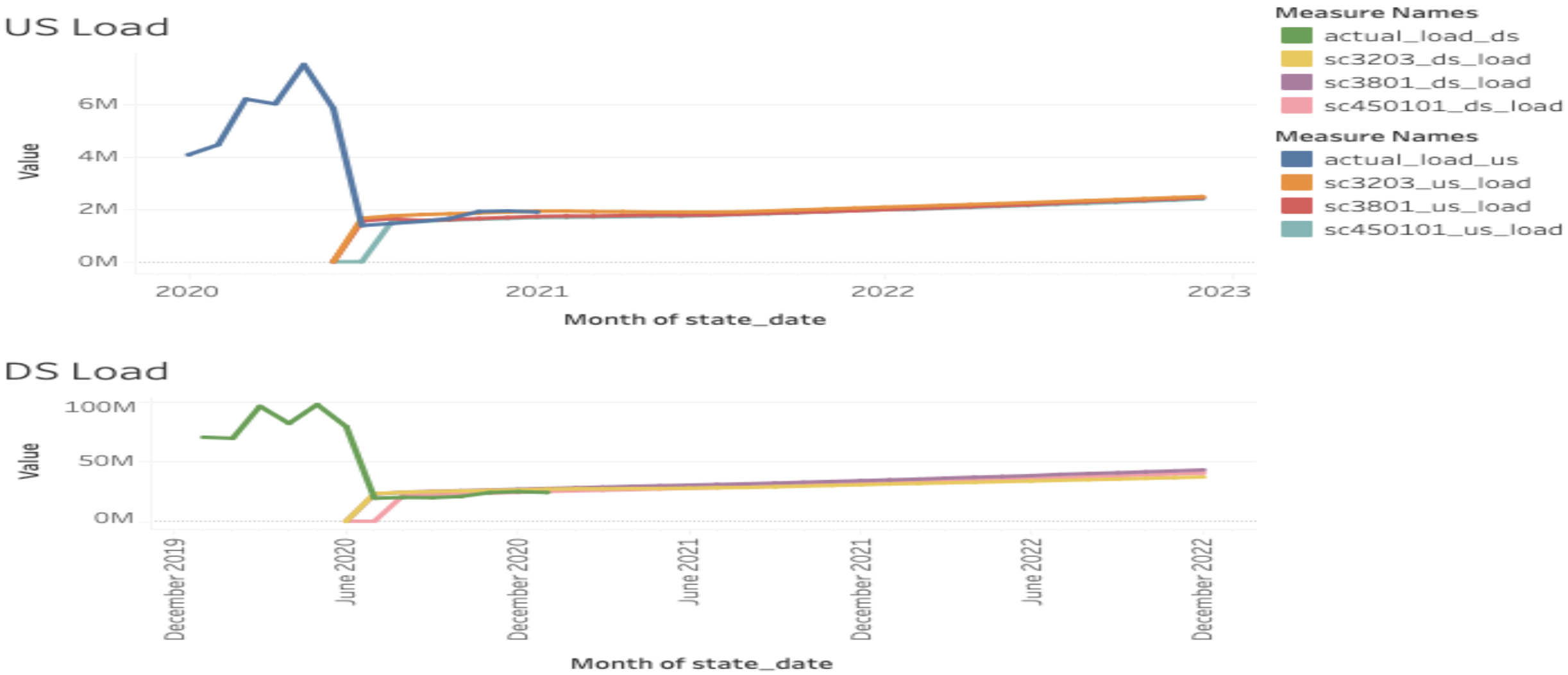
Evolution of Technology: Innovations like DOCSIS 4.0 are creating alternate paths to Multi-Gig Symmetry.

Node Action Goal: Each node action should allow the node to grow for 4-6 years without having to be revisited

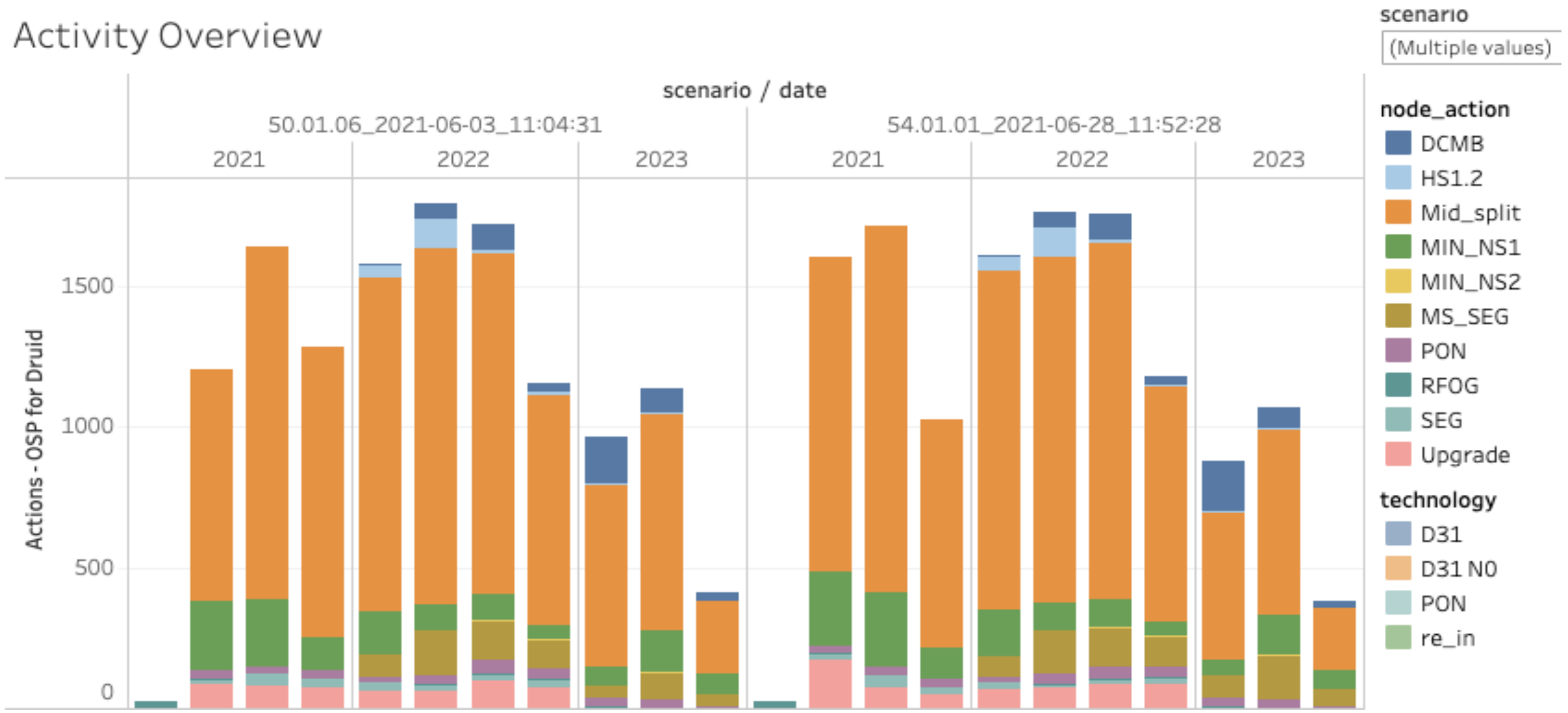
Impact of Current Technology: Factor various impacts from options like OFDM/OFDMA, FDX, Extended Spectrum DOCSIS (ESD), and PON

Scenario Planning: A significant amount of “what-if” scenario planning must be done to compare alternatives and ultimately create a plan for the systems

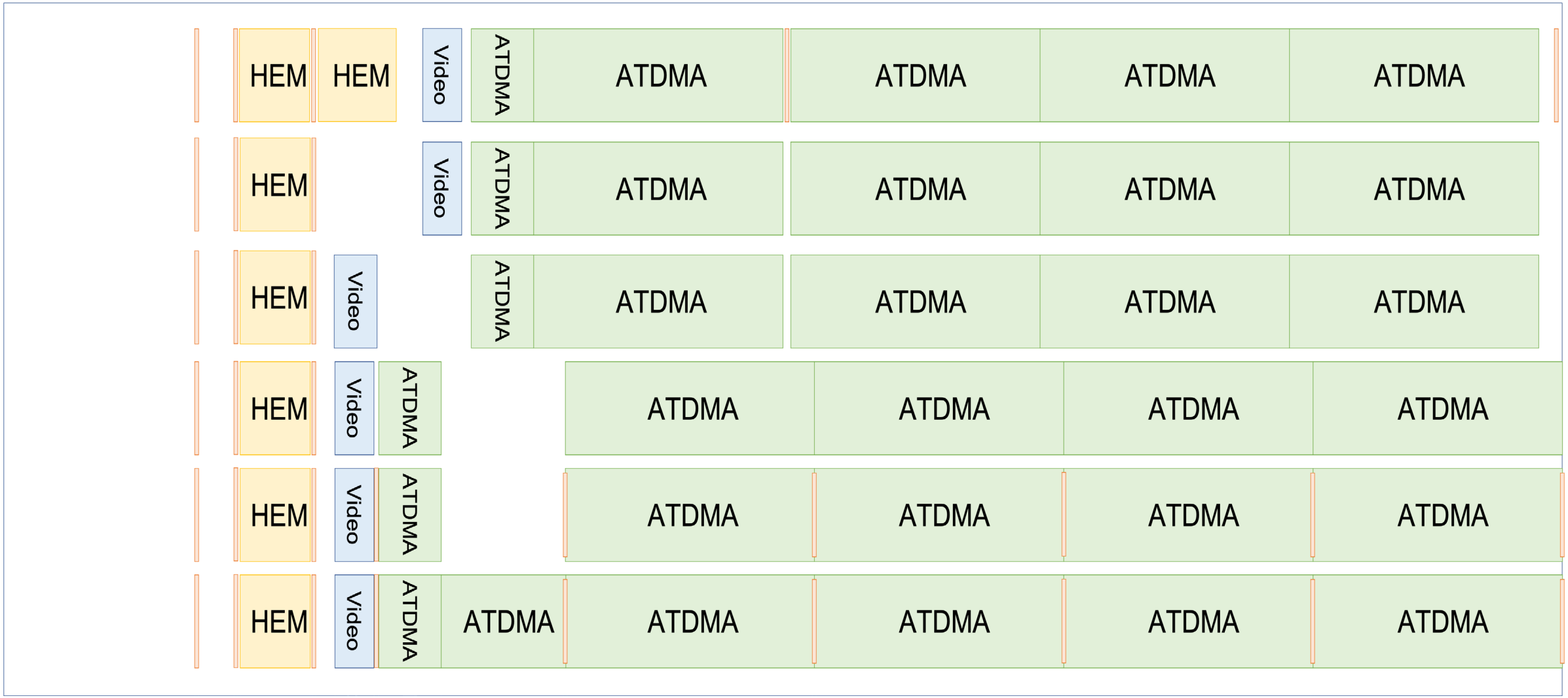
Enterprise Node Load Forecast Comparisons



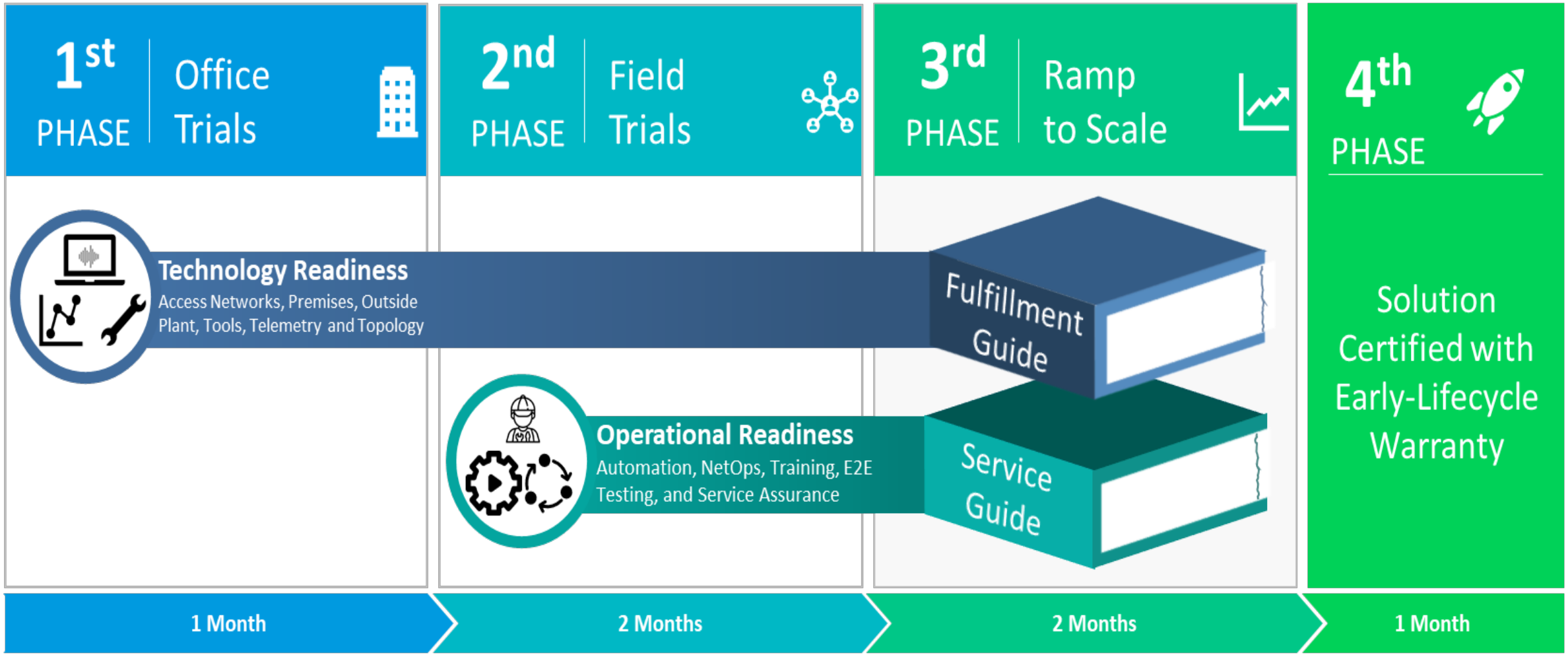
Automated Node Action Comparison



Plan

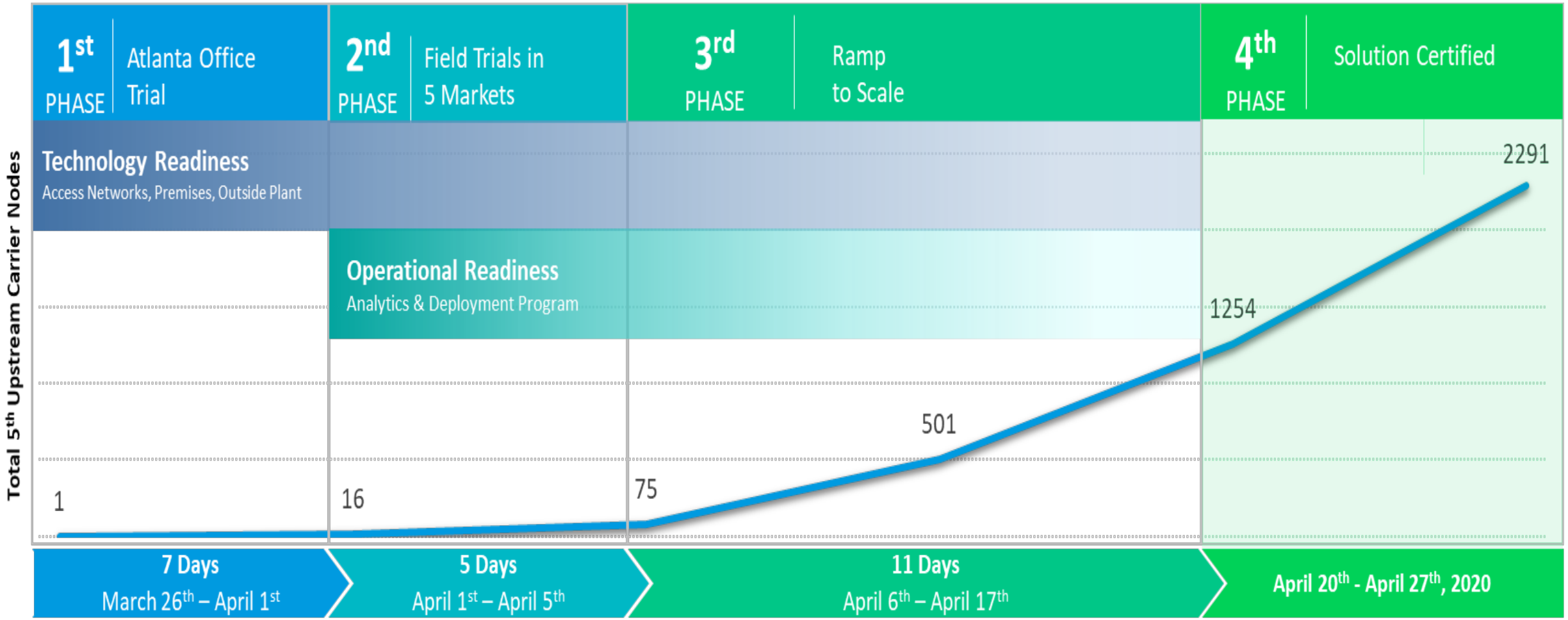


Deploy: Solution Certification Process



Example of scheduling.
Timing may range from 6 – 18 months

5C Solution Certification



ACoE Node Prioritization Dashboard

Node Prioritization

COX

Prioritization Sort: 3M

Upcoming Action Filter: (All)

Completed Action Filter: (All)

Region: (All)

Site: (All)

Headend: (All)

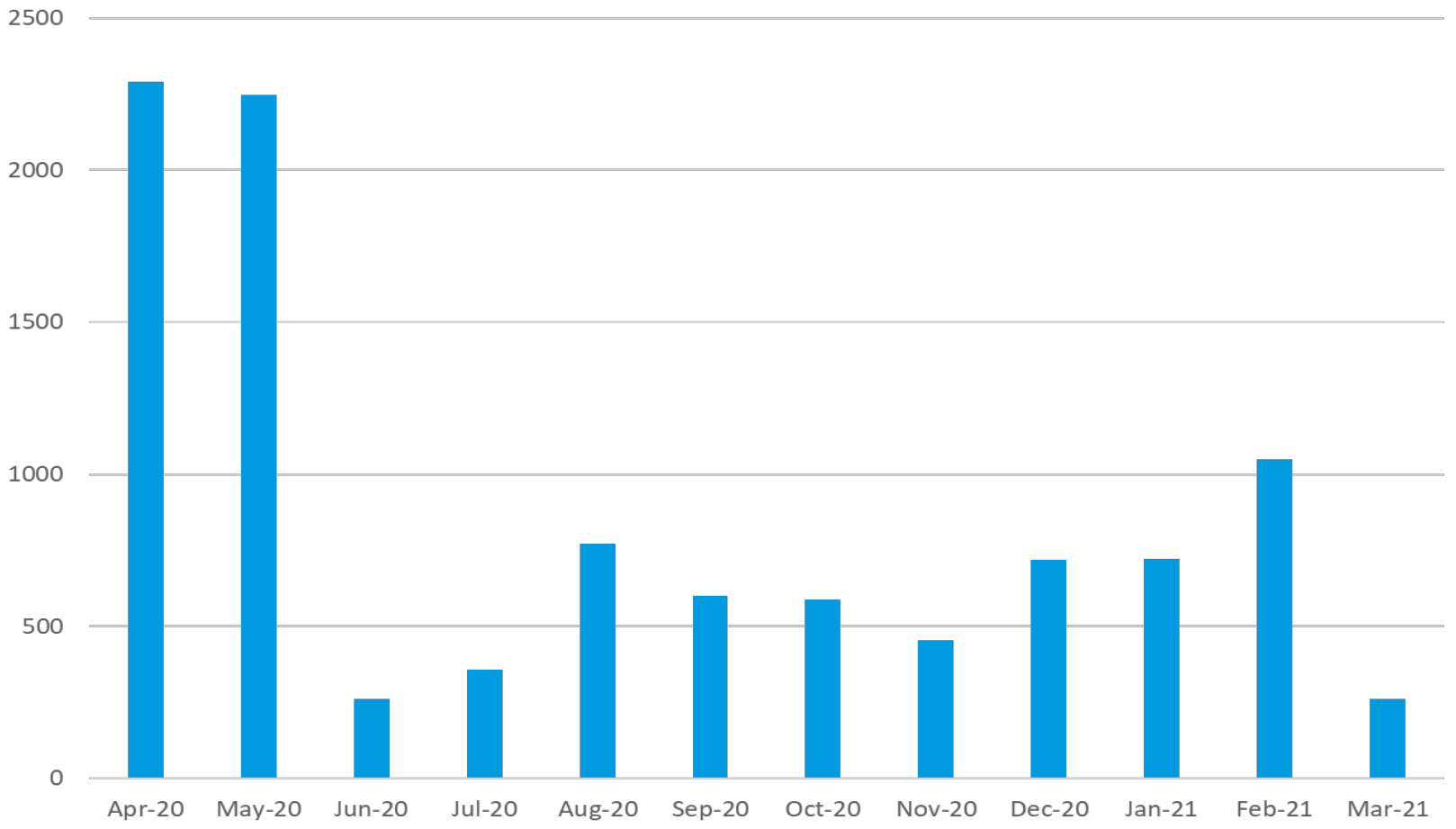
CMTS: (All)

Node: (All)

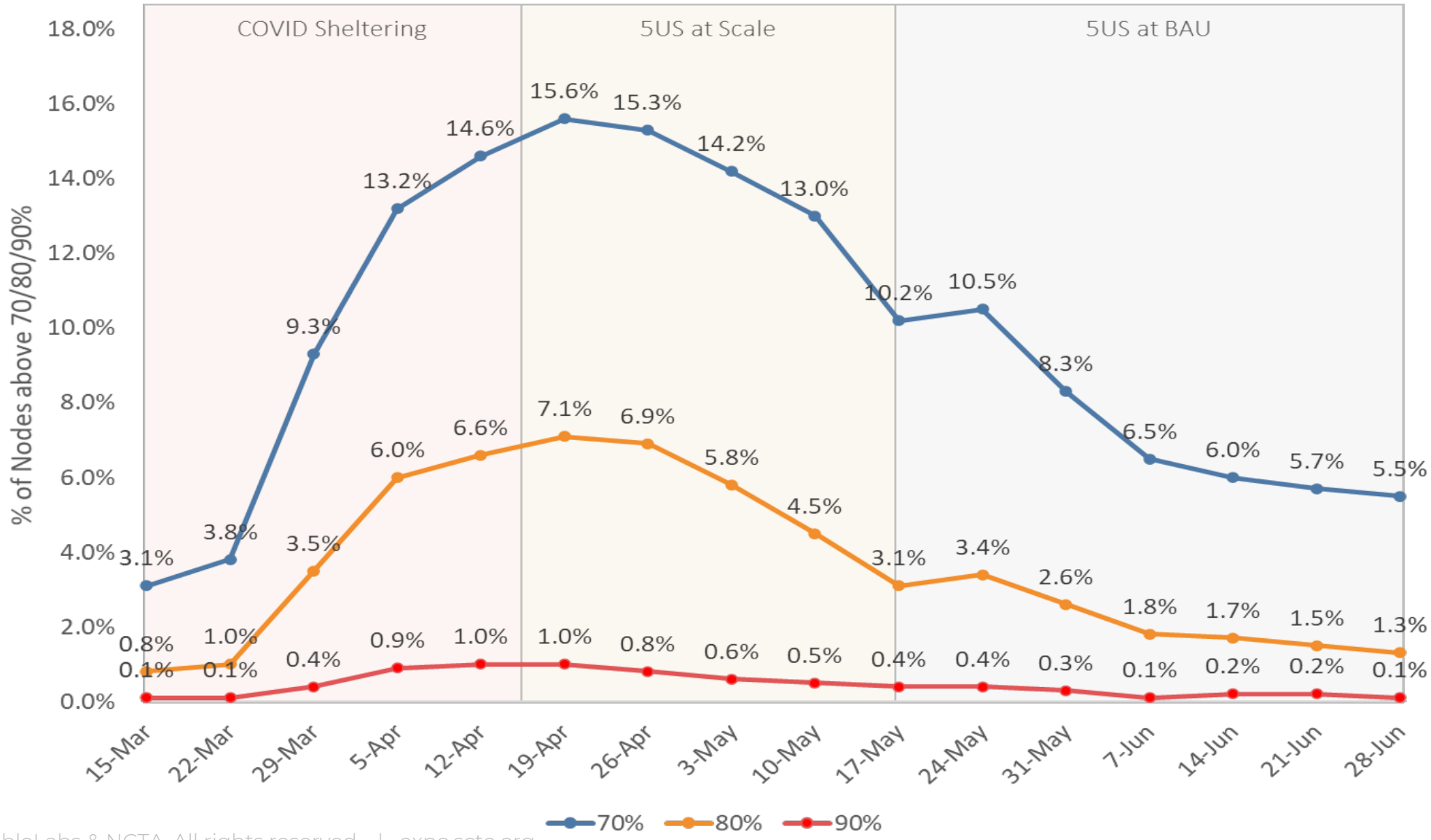
CB Tier: (All)

Node	Interface	CMTS	3M US	1M US	LW US	Max. Customer Count	Ultimate Classic Customers	Gigablast Customers	US Channel Flag	US Channel Date	Node Priority
LVADH	Cable9/0/4	SWSTCAPC04	46.98	46.57	47.61	294	17	102			1
1326R	Cable1/0/2	ELCNCAPC02	54.28	54.77	53.74	315	11	62	Mid-Split	2021-01-21	2
NE115	Cable2/0/3	NOE1CAPC01	77.94	74.49	62.12	434	12	45	Mid-Split	2020-11-18	3
EB16	Cable8/0/4	ILH1CAPC01	75.28	62.14	64.54	26	0	0	Mid-Split	2021-01-22	4
01853	Cable3/0/5	BELLCAPC05	79.46	82.69	81.92	494	8	60	Mid-Split	2021-06-14	5
7YDY1	Cable3/0/5	SNTBRPCC23	78.07	60.77	50.96	362	6	62	Mid-Split	2021-07-06	6
01047	Cable6/0/2	BELLCAPC07	76.46	68.63	53.61	444	16	78	Mid-Split	2021-07-20	7
8AWB1	Cable2/0/1	MCDLRPCC01	60.69	65.72	68.60	220	5	15	Mid-Split	2020-11-09	8
7YEB1	Cable6/0/6	SNTBRPCC23	44.62	43.52	45.13	540	7	34	Mid-Split	2020-11-02	9
353L	Cable2/0/2	DT1XCAPC04	75.54	75.54	76.44	390	18	65	Mid-Split	2021-07-27	10
7YAD2	Cable2/0/1	SNTBRPCC24	75.14	75.14	54.30	443	26	25	Mid-Split	2021-07-19	11
91	Cable1/0/4	DT1XCAPC01	79.44	79.22	77.15	503	4	43			12
348B	Cable7/0/6	DT1XCAPC04	78.33	72.67	69.86	312	4	4	Mid-Split	2021-07-21	13
7YDA1	Cable3/0/6	SNTBRPCC23	75.97	65.42	67.86	584	73	20	Mid-Split	2020-08-26	14
2471B	Cable6/0/2	VISTCAPC06	77.52	76.45	69.70	336	3	15	Mid-Split	2021-06-11	15
7YAV1	Cable2/0/9	SNTBRPCC24	77.35	72.79	65.40	320	12	8	Mid-Split	2021-02-18	16
NE105	Cable6/0/3	NOE1CAPC01	76.54	74.86	76.85	432	6	54	Mid-Split	2021-06-10	17
TC035	Cable3/0/6	TYCRCAPC05	75.79	62.27	46.65	318	7	15	Mid-Split	2021-07-06	18

5C Enablements



Utilization and 5C



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Thank You!

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