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November 15, 2019

**VIA ECFS**

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, DC 20554

**Re: *Ex Parte* Presentation of ACA Connects—America's Communications Association;  
*Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122**

Dear Ms. Dortch:

On November 13, Matthew Polka, President and CEO of ACA Connects—America's Communications Association ("ACA Connects"); Patty Boyers, Chairman of the Board of ACA Connects; and the undersigned (collectively, "ACA Connects Representatives") met with Commissioner Michael O'Rielly and his advisor, Erin McGrath. On November 14, the ACA Connects Representatives met, in separate meetings, with Chairman Ajit Pai and his advisor, Aaron Goldberger; Commissioner Brendan Carr and his advisor, Will Adams; Commissioner Jessica Rosenworcel and her advisor, Umair Javed; and Commissioner Geoffrey Starks and his chief of staff, Bill Davenport.

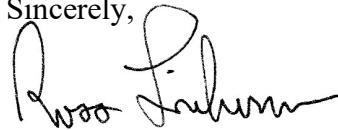
In each meeting, ACA Connects Representatives expressed ACA Connects' continued support for the 5G Plus Plan, which remains the only plan on record that would rapidly unleash C-Band spectrum for 5G use while protecting incumbent users, including small and rural multichannel video programming distributors ("MVPDs"). ACA Connects Representatives discussed the attached presentation, which details the glaring deficiencies of the C-Band Alliance's ("CBA's") recently disclosed plan to use video signal compression and other techniques to cram existing C-Band users into a mere 200 MHz portion of the band. As explained in the attached presentation, CBA's latest proposal would leave MVPDs, especially in rural America, with a C-Band that fails to meet their current and future needs. Furthermore, CBA contemplates a massively complex transition that could not be accomplished within the timeframe or budget that CBA projects. The Commission must therefore reject CBA's proposed transition plan.

ACA Connects Representatives also stated that any successful repurposing of significant C-Band spectrum for 5G use requires that existing MVPD earth station operators be reimbursed

for the costs of migrating their video operations from the C-Band to fiber. The 5G Plus Plan accommodates such a migration. As explained in the presentation, there are several potential fiber-based video delivery solutions for those MVPDs, including solutions that permit video programmers to maintain use of the C-Band to deliver video. Moreover, the costs for an MVPD to employ such solutions would be comparable to those of the substantial equipment upgrades, labor costs, and other transition activities required under the CBA plan, but the benefits could potentially be much greater.

Accordingly, ACA Connects urges the Commission to ensure that MVPD earth station operators are given the flexibility – and the funds – to elect fiber-based video solutions that best meet their needs. ACA Connects encourages the Commission to seek comment on the adoption of a transition plan for MVPDs that includes these elements. Finally, any transition plan the Commission ultimately adopts for MVPDs must put in place a neutral administrator – rather than CBA – to oversee the transition.

Sincerely,

A handwritten signature in black ink, appearing to read "Ross Lieberman". The signature is fluid and cursive, with a large initial "R" and "L".

Ross Lieberman

Attachment

Cc: Chairman Ajit Pai  
Commissioner Michael O'Rielly  
Commissioner Brendan Carr  
Commissioner Jessica Rosenworcel  
Commissioner Geoffrey Starks  
Aaron Goldberger  
Erin McGrath  
Will Adams  
Umair Javed  
Bill Davenport

# 5G Plus Plan: The Case for Fiber-Based Video Distribution

November 2019

Prepared for:



AMERICA'S  
COMMUNICATIONS  
ASSOCIATION  
*#ACAConnects*



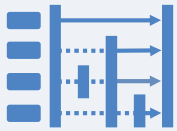
# Optimizing C-Band Spectrum Clearing

The 5G Plus Plan remains the best option for clearing the most C-Band spectrum while simultaneously bridging the digital divide with rural communities through fiber buildouts



The CBA's latest proposal<sup>1</sup> leaves MVPDs with C-Band services that are *less reliable, less affordable, more prone to interference and unable to meet future demand*

**This is an unacceptable outcome for consumers, particularly those in rural America**



The CBA vastly underestimates the cost, complexity, timing, and overall burden of its proposed transition

**Latest CBA proposal will cost at least \$6 billion and take more than three years**



The 5G Plus Plan can provide flexibility and modularity – video programmers could remain on the C-Band, while MVPDs employ fiber-based solutions including:

- *Connecting to an existing terrestrial-based video transport provider*
- *Interconnecting headend clusters to super headends*

**Costs are comparable to other solutions and well worth the substantial benefits**

1. The CBA's alternative plan repacks all existing users into 200 MHz with no fiber alternative






Source: Cartesian, ACA Connects

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# The CBA Proposal Will Harm the TV Industry and Its 80M+ Customers

The latest CBA proposal – once again light on details – is a step in the wrong direction and does not provide cable operators, and particularly their rural customers, with a future-proof solution

## What Can Cable Operators and Their Customers Expect?

1	 <b>Reduced Access to New and Higher-Resolution TV Services</b>	Cramming content into a smaller section of spectrum prevents programmers from offering new and higher-bandwidth TV services, such as ultra high-definition (UHD) content
2	 <b>Reduced Reliability of C-Band Transport</b>	Reliability decreases with limited availability of back-up transponders, to the detriment of end-user customers
3	 <b>Higher Operational Costs</b>	Reducing C-Band capacity would subject programmers to de facto monopoly pricing on remaining spectrum, which ultimately could be passed on to MVPDs and potentially consumers
4	 <b>Intolerable Risks of Signal Interference</b>	Relying on new and untested filters to block out 5G signals would introduce risks of interference that threaten video quality
5	 <b>Disproportionate Harms to Rural MVPDs</b>	Rural MVPDs that lack fiber alternatives will suffer most from the end-state of the CBA transition, placing them at a competitive disadvantage against larger MVPDs with fiber alternatives

**SEE SLIDES 18-23**

# The New CBA Proposal Is “All Pain, No Gain” for MVPDs

Breezy CBA filings obscure the burdensome and costly nature of their proposal, particularly for small and rural cable operators, and suggest operators will not be reimbursed for significant costs

## What Would the Transition Mean?

1



### A Grueling Series of Time-Consuming Tasks

The transition will be complicated by many moving parts across the entire video distribution industry, with many considerable risks of delay at each stage

2



### Significant Out-of-Pocket Expenses

The CBA grossly underestimates transition costs, particularly for MVPDs, suggesting these users must divert their own funds from other broadband investments to pay for the transition

3



### Investment in Assets with Limited Utility

The transition would waste billions of dollars on a diminished C-Band, rather than investing in assets, like fiber, that can offer high quality video delivery and improve broadband services

4



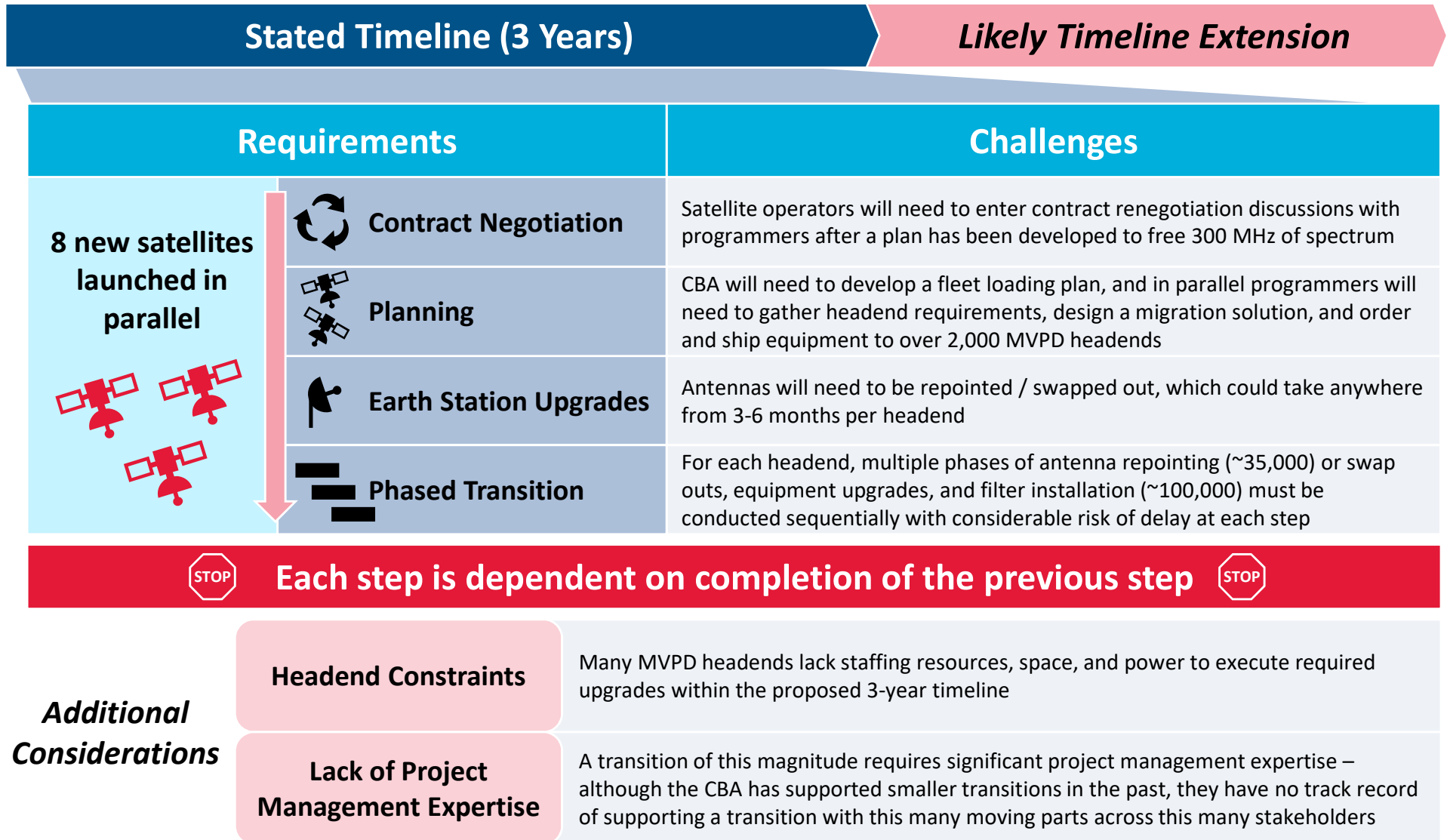
### The Death of Smaller, Rural Cable Systems

MVPDs distribute video over a variety of architectures, or with third parties assistance – the complexity and unclear financial support will likely push smaller MVPDs out of the industry

**SEE SLIDES 25-28**

# Transitioning to Higher Compression Could Take 5 Years

The sheer complexity of the transition makes CBA's 3-year timeline unrealistic – nothing of this magnitude, with this many moving parts across various stakeholders, has ever been executed



SEE SLIDE 25

## Transitioning to Higher Compression Will Cost At Least \$3 Billion

Accounting for equipment upgrades, labor, and operational costs, the CBA-proposed transition is expensive and comes with no commitment from the CBA to fully reimburse the costs

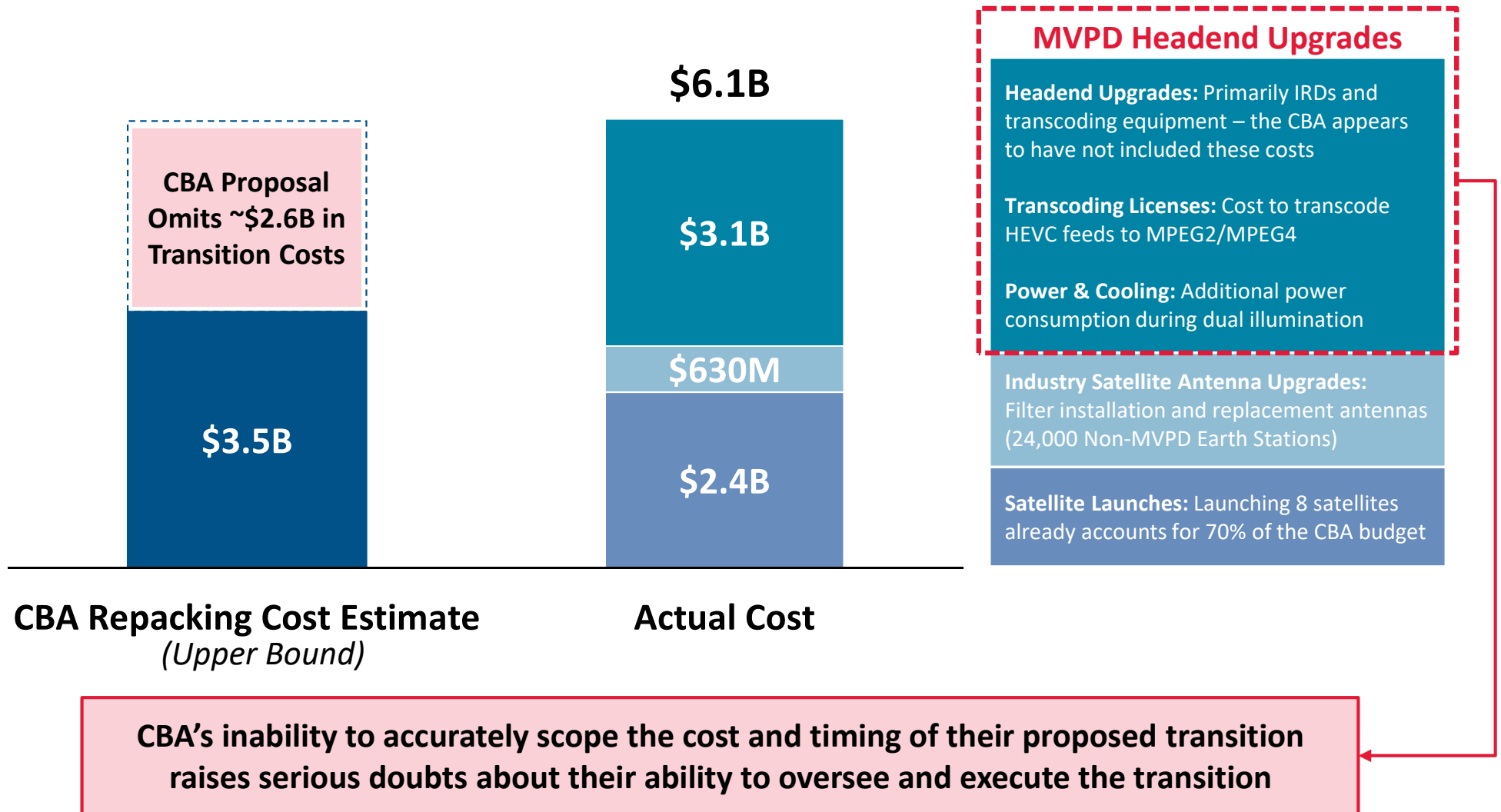
Requirement	Description	Expenditure	
		Equipment	Labor
<b>Headend Equipment</b>	<ul style="list-style-type: none"> <li>To receive more highly compressed content, MVPDs must replace nearly all IRDs <ul style="list-style-type: none"> <li>› IRDs that can also transcode will be needed as many MVPD headends do not have the space to accommodate separate transcoders</li> </ul> </li> </ul>	<b>\$2.0B</b>	<b>\$80M</b>
<b>IRD Licensing</b>	<ul style="list-style-type: none"> <li>In addition to headend equipment, transcoding licenses will need to be covered <ul style="list-style-type: none"> <li>› Headends will be charged licensing fees for each IRD that's upgraded</li> </ul> </li> </ul>	<b>\$660M</b>	<b>N/A</b>
<b>Testing Equipment</b>	<ul style="list-style-type: none"> <li>Testing equipment required to ensure signal quality <ul style="list-style-type: none"> <li>› With the introduction of new compression and modulation schemes within a short window, MVPDs will need testing equipment to ensure signal quality</li> </ul> </li> </ul>	<b>\$90M</b>	<b>N/A</b>
<b>Earth Station Upgrades<sup>1</sup></b>	<ul style="list-style-type: none"> <li>The use of new satellite orbital slots and higher modulation schemes will require MVPD earth stations to install new and/or larger antennas <ul style="list-style-type: none"> <li>› Process requires third party installation and can take 2-3 months each</li> </ul> </li> </ul>	<b>\$25M</b>	<b>\$140M</b>
<b>Power Increases</b>	<ul style="list-style-type: none"> <li>Maintain dual feeds throughout CBA Commitments <ul style="list-style-type: none"> <li>› Electrical costs will need to be incurred for three years of cooling, dual IRDs, and any transcoders</li> </ul> </li> </ul>	<b>\$145M</b>	<b>N/A</b>
<b>Total Reimbursable Cost to MVPDs Alone</b>		<b>\$2.9B</b>	<b>\$200M</b>
		<b>TOTAL: \$3.1B</b>	

SEE SLIDE 13



## The CBA Proposal Underestimates Transition Costs

The CBA's stated costs of \$2.5 to \$3.5 billion to clear 300 MHz is a wildly insufficient estimate, suggesting the CBA either lacks sufficient understanding of the transition's complexity for MVPDs, or expects MVPDs to incur significant out-of-pocket expenses



SEE SLIDE 13

## The Better Course – Give MVPDs a Fiber Option

Without a unified approach to clear C-band spectrum for 5G use prior to an FCC Order, MVPDs should have the right to choose a technology-based transition that best meets their future needs

*“No subset of stakeholders—whether earth station operators, terrestrial facilities owners, or satellite service providers—should force technology choices upon the entire ecosystem.”*

— [AT&T](#)<sup>1</sup>

*“Video distributors should continue to have flexibility to determine the technologies that best meet their needs going forward – whether continued use of C-band or fiber or something else.”*

— [Verizon](#)<sup>2</sup>

*“Market participants should retain the autonomy to determine what makes them “whole” rather than having the FCC dictate the new market structure.”*

— [AT&T](#)<sup>1</sup>

**The Commission can provide fiber-based solutions for MVPDs  
without obligating programmers to migrate to fiber**

1. AT&T Ex-Parte August 7, 2019 [AT&T](#)

2. Verizon Ex-Parte October 9, 2019 [Verizon](#)

Source: Cartesian, ACA Connects

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## 5G Plus Plan Can Modularity for MVPD Earth Station Users

Rather than force upgrades of all earth station/headends as proposed under the CBA plan, the 5G Plus Plan can give video distributors flexibility to choose technologies that best meet future needs

Alternative <sup>1</sup>	Description	Benefits	Avg. Cost per Headend <sup>3,4</sup>
<b>Collapse Headends into Super-headends</b>	<ul style="list-style-type: none"> <li>Upgrade two headends per regional cluster into super-headends that can get programming in higher compression via C-band</li> <li>Collapse remaining headends and interconnect them to the super-headends by getting redundant 10G fiber</li> <li>Obtain equipment needed at collapsed headends to receive content from super-headends via fiber</li> </ul>	<ul style="list-style-type: none"> <li>Fiber Connectivity (<b>50K New Route Miles of Fiber</b>)</li> <li>Lower Risk Transition</li> <li>Lower Operational Costs</li> <li>Programmers utilize C-Band</li> </ul>	<b>\$1.4M</b>
<b>Collapse Headends with Managed Video Service Provider<sup>2</sup></b>	<ul style="list-style-type: none"> <li>Connect one headend per regional cluster to a managed video service provider by getting redundant 10G fiber</li> <li>Enter 10-year agreement with the managed video service provider to receive programming terrestrially</li> <li>Collapse remaining headends and interconnect them to the one connected headend by getting redundant 10G fiber</li> </ul>	<ul style="list-style-type: none"> <li>Fiber Connectivity (<b>80K New Route Miles of Fiber</b>)</li> <li>Lower Risk Transition</li> <li>Improved Video Product</li> <li>Programmers utilize C-Band</li> </ul>	<b>\$1.7M</b>
<b>Migrate All Headends to Higher Compression</b>	<ul style="list-style-type: none"> <li>Upgrade all headends to get programming in higher compression via C-band</li> <li>Painful transition to reach a lesser end-state</li> <li>No improvement in broadband connectivity</li> </ul>		<b>\$1.4M</b>

**Interconnecting remote headends is less complex, and a more efficient use of MVPD time and labor, than migrating all headends to a higher compression standard**

- Neither fiber-based modules require programmers to migrate to fiber – it's expected they continue to offer services using higher compression and modulation, consistent with CBA plan
- Third parties such as Vubiquity or MobiTV already distribute content to MVPDs via terrestrial fiber – they would only need to expand networks to accommodate a larger customer base
- Estimated based on 2,200 MVPD headends
- Estimated costs are averages and **do not** indicate actual payouts for cable operators based on selected options – actual payouts to be determined based on review of MVPD network architecture and needs

Source: Cartesian, ACA Connects

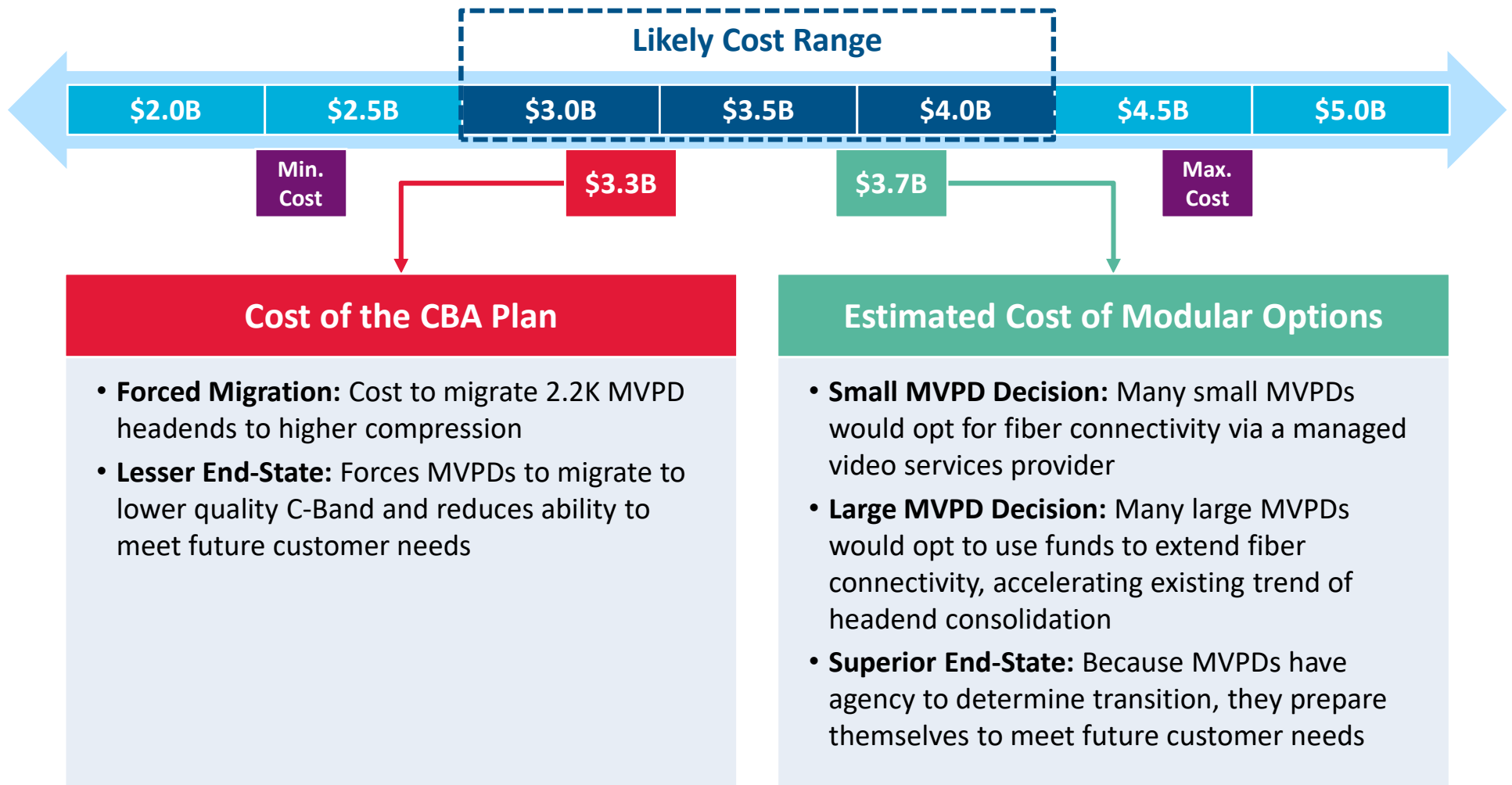
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**SEE SLIDES 14-15**



## Cost Range of Options

Depending on individual MVPD decisions, the cost of providing optionality ranges from \$2.4B to \$4.6B – based on an analysis of likely business decisions, the total cost is estimated at approx. \$3.7B



SEE SLIDES 14-15



BOSTON

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KANSAS CITY

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LONDON

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NEW YORK

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PARIS

# Appendix

- CBA Costs vs Fiber-Based Video Solution Costs
- CBA Harms to the MVPD Industry
- CBA Transition Risks

# Cost Model Calculations for MVPD Migration

Requirement	Calculation <sup>1</sup>		
Headend Equipment <sup>2</sup>	2.2K Headends	x 100 IRDs	x \$8K
Earth Station Upgrades <sup>3</sup>	2.2K Headends	x 2 Satellites	x \$35K
Testing Equipment <sup>4</sup>	1.0K Headends	x 1 Spectrum Analyzer 1 Packet Analyzer	x \$70K
IRD Licensing <sup>5</sup>	2.2K Headends	x 150 New Licenses	x \$2K
Power Increases <sup>6</sup>	2.2K Headends	x 10 Dual Illuminated IRDs	x \$600
		Additional Cooling Cost	\$1.5K

1. Calculations are intended to explain estimates at a high-level; actual calculations may vary slightly

2. Cost assumes HEVC IRDs have functionality to transcode feeds – estimate allows flexibility for MVPDs to purchase a cheaper IRD and transcode separately

3. Cost to install filters and replace old satellites to ensure adequate signal quality for feeds with higher modulation (assumed third party contracted to execute project)

4. Cost for MVPDs without testing equipment to purchase hardware to test feed quality before operationalizing

5. Cost for new licenses to transcode HEVC to MPEG4 and MPEG2 – assumes 75% of existing licenses need to be replaced

6. Annual cost for additional hardware and during dual illumination period – cooling costs not included in this calculation

Source: Cartesian, ACA Connects

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## Regional Earth Station/Headend Clusters with an Managed Video Service Provider

MVPDs will interconnect their earth station/headends with fiber and then establish a connection to a managed video service provider that provides video feeds terrestrially

Category	Cost	Comments
Fiber Connectivity	\$3.0B <sup>1</sup>	Cost for all MVPDs to establish redundant 10G fiber connectivity to a statewide network
Network Expansion Costs	\$500M	Cost to an existing managed video service providers to expand their network to carry national feeds – network carries MPEG2, MPEG4, SD, HD channels on a 20G backbone
Managed Service Fee	\$170M	Service fee of the managed video service fee for 10-years – MVPDs are reimbursed this cost and will pay the managed video services provider
Equipment	\$30M	Upfront fee charged to MVPDs to install equipment at cable headends, managed remotely Managed Video Services Provider
<b>TOTAL COST<sup>1</sup></b>	<b>\$3.7B</b>	<b>Total 10-year cost to deploy fiber to enable video transport via and existing Managed Video Services Provider (e.g. VUBIQUITY, MOBITV, HITS)</b>

1. This is the maximum cost for all eligible MVPDs, including those who are unlikely to select Vubiquity over higher compression C-Band feeds

Source: Cartesian, ACA Connects

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## Regional Earth Station/Headend Clusters with Super Headends

Interconnection of MVPD headends allows for a fewer headends to be required to migrate to higher compression standards which is burdensome on their operations

Category	Cost	Comments
Interconnection Costs	\$1.7B	Cost for all MVPDs to interconnect their headends with redundant 10G fiber so that video feeds can be fed from few receiving headends
Compression Migration Costs	\$1.2B	Cost for all MVPDs to install HEVC receiving equipment at each super headend – includes the cost to upgrade all MVPDs with a single headend
Equipment Costs at Collapsed Headends	\$160M	Cost for all MVPDs to install convertors, transcoders, switching equipment that is installed at the collapsed headends
<b>TOTAL COST<sup>1</sup></b>	<b>\$3.1B</b>	<b>Total 10-year cost to deploy interconnecting headend fiber that enables video delivery across MVPD networks fed by a super headend</b>

**Interconnecting remote headends is less complex and a more efficient use of MVPD time/labor than migrating these headends to a higher compression standard**




1. This is the maximum cost for all eligible MVPDs, including those who are unlikely to select Vubiquity over higher compression C-Band feeds

Source: Cartesian, ACA Connects

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## Managed Video Service Providers

There is already a business model to support MVPDs that collapse headends by connecting to a managed video service provider

Third-Party Video Delivery Solutions	
	<p><b>Network:</b> Operates two downlink sites in Los Angeles and New York where content is aggregated and distributed to 11 points of presence and to customers across the country</p> <p><b>Expansion:</b> Vubiquity is able to expand their points of presence quickly for MVPDs who opt to build connecting fiber to their network</p>
	<p><b>Network:</b> Atlanta and Sacramento and operates a fiber network that distributes video content across the nation</p> <p><b>Product:</b> Offers 375+ single national feeds from 53 content providers and would be able to provide drop-points for MVPDs to build connecting fiber to</p>
	<p><b>Network:</b> Operates downlink and uplink to deliver content over a satellite network to small MVPDs (with a focus extending the life of MPEG2 plant)</p> <p><b>Expansion:</b> Comcast has an extensive fiber network HITS could leverage in, theory to, to distribute content terrestrially</p>

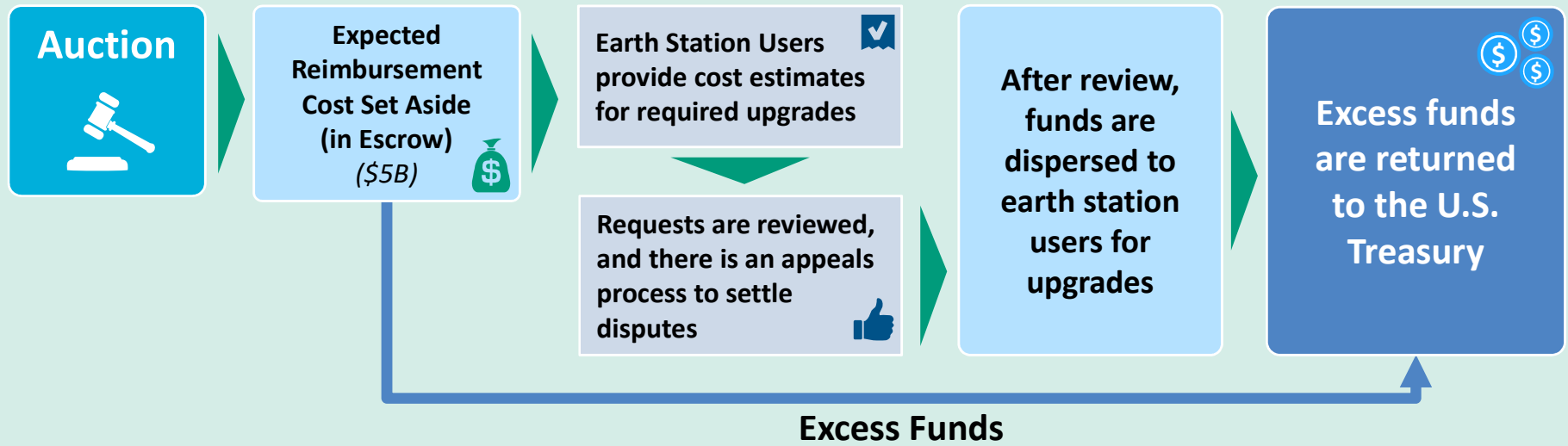
# Facilitating the Transition

One or more transition facilitators will be relied upon to assist impacted users in clearing the C-band for 5G

## The Transition Facilitator

- A transition facilitator, as designed by the FCC, would provide impacted MVPDs with reimbursement funds, goods and/or services, consistent with the MVPDs' choice of a c-band clearing solution.
- The same or different transition facilitator would provide other C-band users with goods and/or services.
- FCC may choose the CBA to be a transition facilitator for some or all of the transition.
- The transition facilitator's decisions will be guided by an FCC approved transition guide and cost catalogue.
- The transition facilitator(s) would not retain right to deny transition funding decisions.

## Reimbursement Model for MVPDs Electing Fiber-Based Solutions













## Appendix

- CBA Costs vs Fiber-Based Video Solution Costs
- CBA Harms to the MVPD Industry
- CBA Transition Risks

# CBA's New Proposal Introduces Harms Where the 5G Plus Plan Seizes Opportunities

While CBA's new proposal would leave the MVPD industry and their customers worse off, particularly cable operators in who are small and rural, the 5G Plus Plan would enable a transition to fiber that would future-proof video transport while also helping close the digital divide

CBA Proposal	5G Plus Plan
 <b>Reduced Access to New and Higher Resolution TV Services</b>	 <b>Fiber has near unlimited bandwidth and enables deployment of new and higher resolution TV services</b>
 <b>Reduced Reliability of C-Band Transport</b>	 <b>The fiber network will guarantee 5 nines of reliability</b>
 <b>Higher Operational Costs</b>	 <b>Fiber-based video distribution steady-state costs are significantly lower than satellite video distribution costs</b>
 <b>Intolerable Risks of Signal Interference</b>	 <b>Fiber transmission offers an isolated medium with no external interferences</b>
 <b>Disproportionate Harms to Rural MVPDs</b>	 <b>Rural MVPDs allotted significant funds to receive video over fiber, which can also meet other connectivity needs</b>

## Reduced Access to New and Higher Resolution TV Services

Attempting to cram existing users into 200 MHz (i.e., 40 percent) of the band would leave not enough bandwidth to accommodate new and innovative services.



### *The new CBA proposal leaves no capacity for offering advanced services*

The C-band will be unable to accommodate UHD channels and even-higher-bandwidth services, like virtual reality, that MVPD customers will demand.



### *The new CBA proposal leaves no bandwidth for improving signal quality*

The C-band will be unable to deliver current programming in higher bitrates, which programmers are tending towards to deliver their signals in higher quality.



### *The new CBA proposal leaves no capacity for launching new programming*

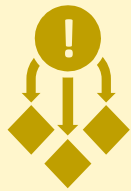
The C-band will be unable to accommodate new channels, or new content creators who may want to offer MVPD programming

## Reduced Reliability of C-Band Transport

Less spare capacity on C-Band satellites means that outages will be more likely, and more severe when they occur



**Transponder Malfunctions:** If a satellite transponder malfunctions, there will be fewer free transponders to support dual illumination while the problem is resolved with the original transponder

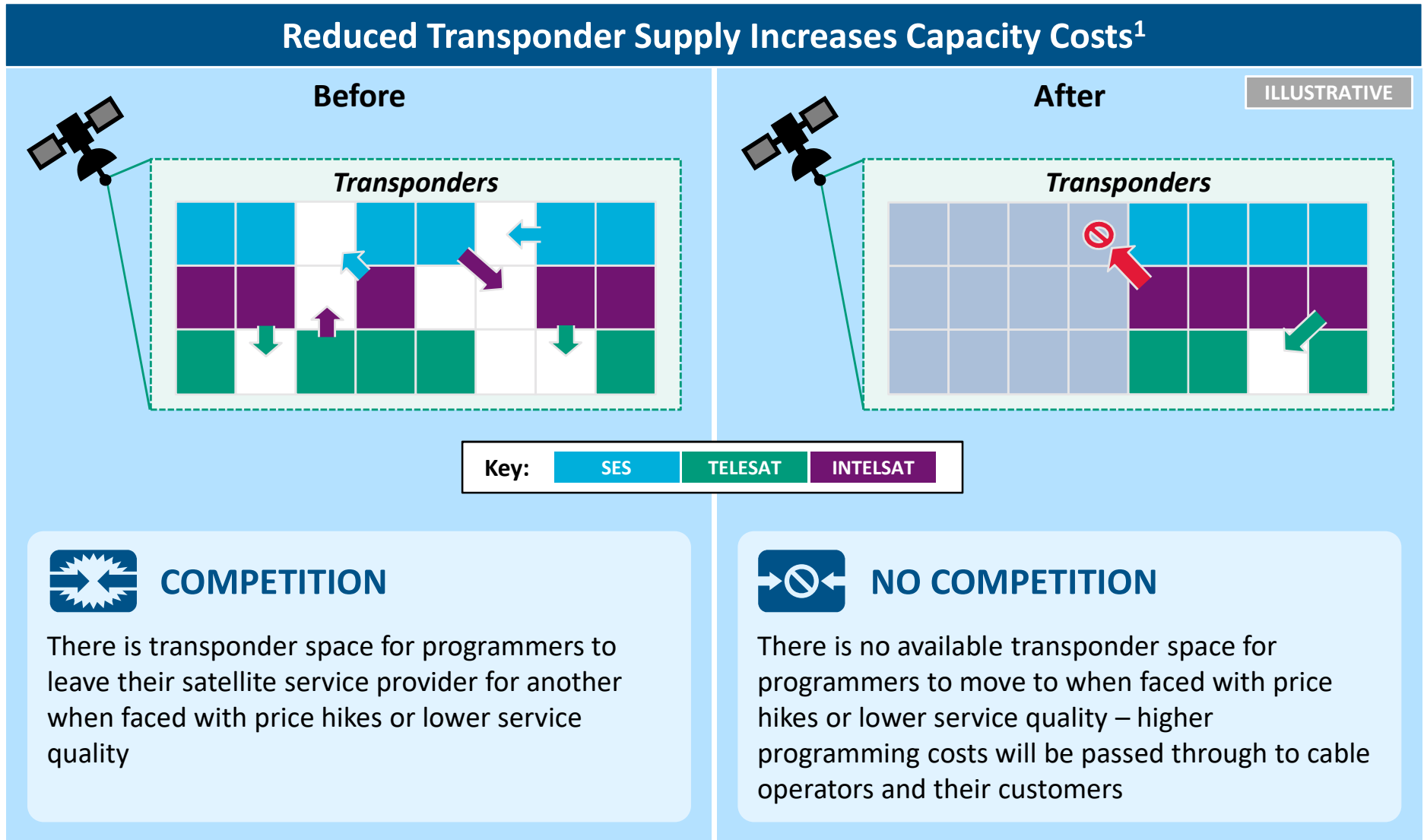


**Malfunctions Impact More Services:** There will be more channels per transponder as more services are crammed into the upper portion of the C-Band – a single transponder or an entire satellite outage will have an impact on a greater number of services compared to the current state

**The end result? Greater risk of disruption  
to video programming for subscribers**

## Higher Operational Costs

With less transponder space, the cost of leasing spectrum will rise for programmers. They will undoubtedly pass through these costs to their cable operator customers, especially smaller ones

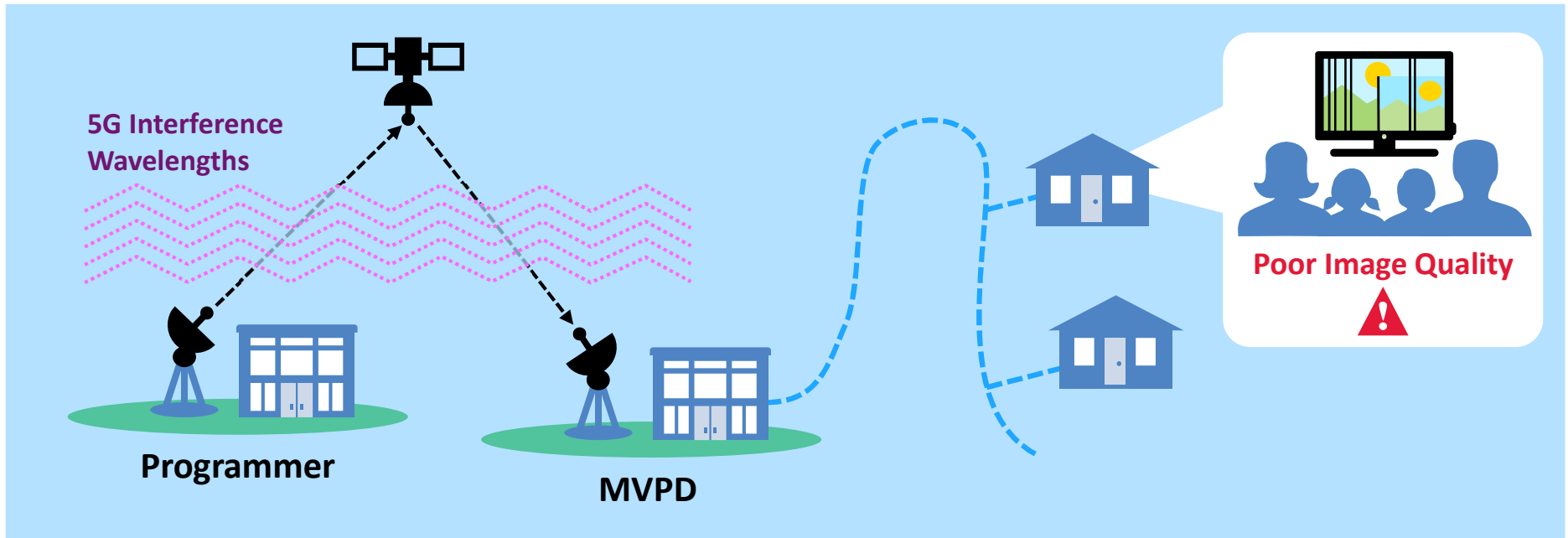


1. If not for transition, satellite operators would have allowed satellites to reach end of life without replacement – clearing 300 MHz forces satellite operators to replace and maintain entire fleet for foreseeable future, and costs will be borne by end users (MVPDs and their customers)  
Source: Cartesian, ACA Connects



# Intolerable Risks of Signal Interference

Relying on new, untested filters to protect C-Band video transmissions from 5G signals would pose interference risks that threaten video quality for customers



## Impact of a Tightly Packed C-Band

- The risk of interference causing harm to video quality for customers is greater than the current state where there is little to no interference
- By compressing programming in a small area, more content just above the guard band will be exposed 5G services that push up against the guard band, creating greater risk of interference

## Many MVPDs operate with smaller dishes that will not provide ample signal quality with higher modulation

- Without upgrading MVPD satellites to minimum sizes, signal quality will greatly degrade in a conversion to higher compression
- The CBA proposal<sup>1</sup> only states that 3.7M dishes are to be reimbursed, which are insufficient to receive 8PSK modulation for some MVPDs

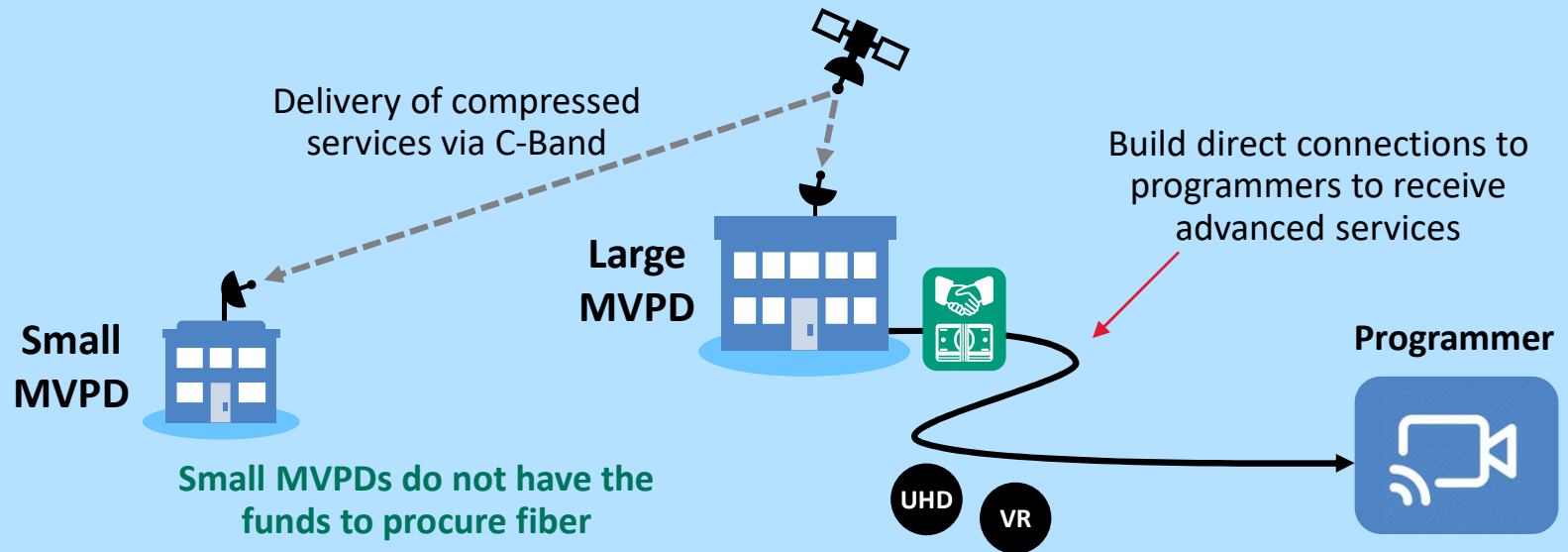
1. [CBA Updated Transition Implementation Process](#)

Source: Cartesian, ACA Connects

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## Disproportionate Harms to Rural MVPDs

Rural MVPDs, who lack access to fiber that could be used as an alternative means of transporting video, will be unable to mitigate these harms.



**Large vs. Small MVPD Divide:** While large urban cable operators are switching to fiber as their delivery path for video programming, this is not an affordable option for many ACA Connects members today

**Competitive Disadvantage:** Without the ability to offer advanced TV services to consumers, small MVPDs may lose business to large MVPDs with the resources to build fiber connections

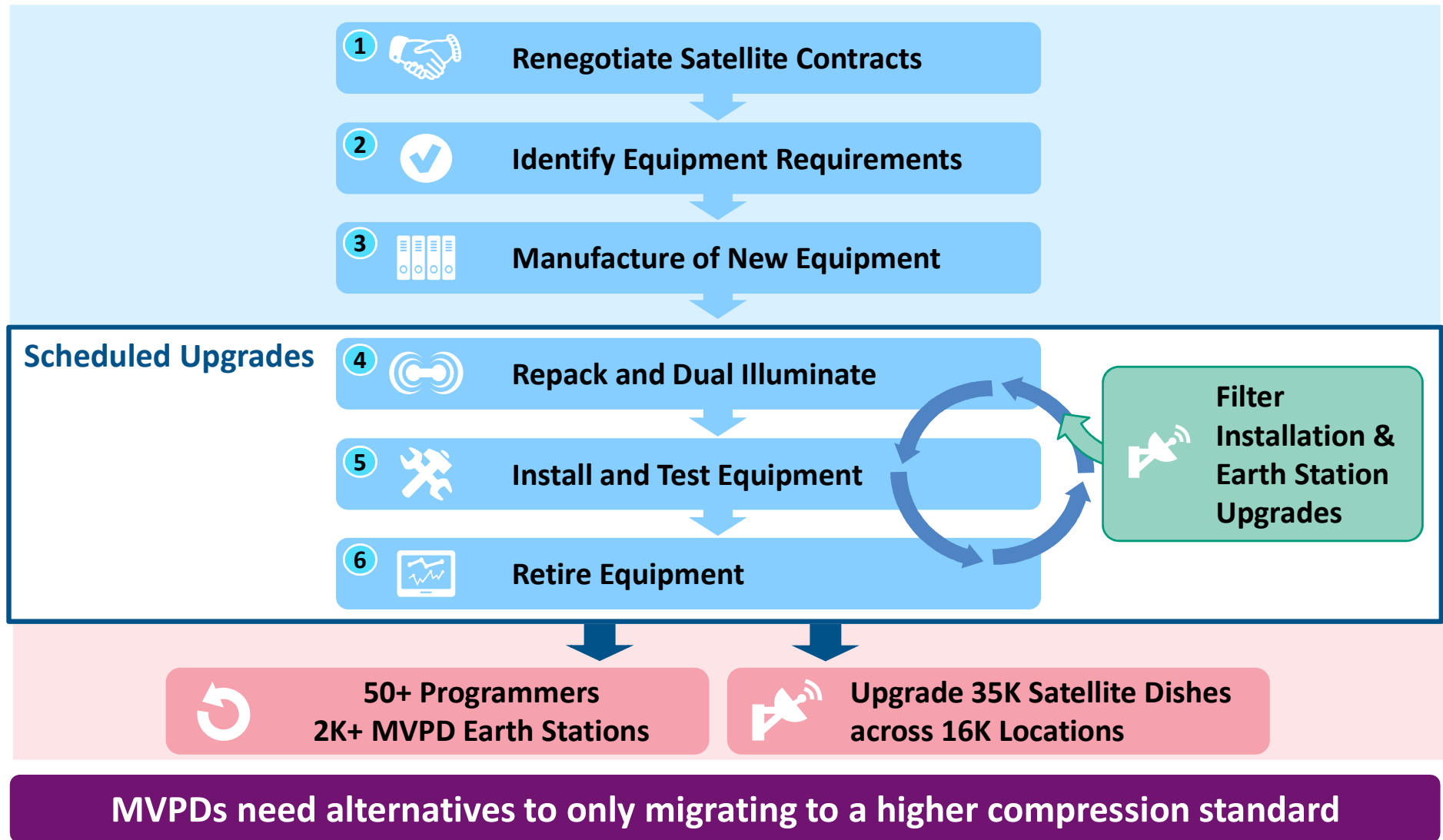
**Interference Isolated to Smaller MVPDs:** Larger MVPDs with fiber will avoid interference and the reliability issues that will arise from the diminished C-Band

## Appendix

- CBA Costs vs Fiber-Based Video Solution Costs
- CBA Harms to the MVPD Industry
- CBA Transition Risks

## A Gruelling Series of Time-Consuming Tasks

The CBA proposal's required transition will be a complicated process with many moving parts across the entire video distribution value chain, especially for smaller MVPDs, with considerable risks of delay at each stage



## Investment in Assets with Limited Utility and Wasted Time

The CBA proposal diverts funds from MVPD activities that would reduce the digital divide towards a severely reduced C-Band

### Investment in Continued Use of Remaining C-Band Spectrum

- Restricts MVPDs ability to serve customers and meet future demand
- Investments support an asset with limited utility
- Time wasted to accommodate transition
- Wastes opportunity to establish fiber connectivity to remote areas

***Investment has negative returns  
for the entire country***

### Investment in Fiber-Based Video Transport

- Enables MVPDs to invest in an asset that allows them to serve existing customers and meet future demand
- Higher quality video transport
- Greater broadband connectivity for rural America

***Investment has positive returns  
for the entire country***

# Threats to the Video Transport Ecosystem for Smaller MVPDs

Smaller MVPDs receive programming in a variety of ways – there is no one size fits all solution and the CBA hasn't explicitly committed to supporting all types of operators and architectures



**Reimbursement must be made available to third-parties supporting cable operators**

- **Reimbursement Eligibility:** Funds must be made available not only to cable operators, but to the third parties that are mission critical to cable operators (e.g., Comcast HITS, VUBIQUITY)
- **Continued Support:** These third parties must continue to support the small cable operators, or else operators need greater reimbursement to just continue with what they have



**All legacy services must be supported by transition**

- **Legacy Architectures:** Small cable operators receive signals at their headends using a variety of antenna sizes and output their signals in a variety of compression standards and resolutions
- **Upgrade Optionality:** These cable operators must receive equipment that allows them to continue operating their service as is – without swapping out consumer premise equipment – and without greater operating expenses in future



**The transition must have FCC oversight to guarantee MVPD requirements**

- **No Oversight:** The CBA reserves the right to refuse any request it deems out of scope or unnecessary to restore service.
- **Risk of Harm:** Without any right of appeal to the FCC, CBA can underfund small operators' greater needs with respect to the complex transition process.

Note: Slide is not exhaustive of all the different permutations of delivery methods and network architectures

1. Represents different pieces of hardware that are capable of transcoding streams – operators have preferences based on existing network architecture

Source: Cartesian, ACA Connects

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# Threatens the Video Transport Ecosystem for Smaller MVPDs

Smaller MVPDs receive programming content in a variety of ways – there is no one size fits all solution and the CBA hasn't explicitly committed to supporting all types of operators and architectures

## Various Video Transport Methods

- **Direct from C-Band:** The transition must accommodate unique architectures that ingest satellite content
- **Satellite Aggregators (e.g. Comcast HITS):** The transition must ensure satellite aggregators are able to receive enough reimbursements so they commit to continue serving smaller cable operators in the future
- **Terrestrial Aggregator (e.g., Vubiquity, Mobi TV):** The transition must ensure that terrestrial aggregators are able to receive reimbursement so they may continue to serve smaller cable operators
- **Combined Delivery:** Some MVPDs leverage a combination of the above methods to receive all of their content (e.g., 80% of content from Vubiquity and 20% of content from C-Band)

Depending on the transport model, operators make a range of headend architecture decisions

Signal Type	Compression	Modulation	Transcoding <sup>1</sup>	Resolution
ASI/Coax	MPEG4	DVB-S	In IRD	Standard Definition
Internet Protocol (IP)	MPEG2	DVB-S2	Dedicated Hardware	High Definition
	HEVC	DVB-S2X	Commodity Hardware	Ultra High Definition

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