

OAE submarine cable pricing options analysis



Presented online 12 June 2024

Topics to discuss

- 1) Telecom sector reform and investment
- 2) Unique challenges for Small Island Developing States
- 3) FSM Government fiber investment policy
- 4) FSM Grant-funded submarine cable capex
- 5) OAE-operated submarine cable opex
- 6) OAE-operated submarine cable opex breakdown
- 7) OAE cost recovery requirement
- 8) FSM submarine cable affordability
- 9) Kosrae international connectivity affordability
- 10) OAE revenue recovery requirements by point-to-point link
- 11) Pricing principles
- 12) Pricing options
- 13) Pricing option 1 - Supply of point-to-point capacity
- 14) Pricing option 2 - Percentage of point-to-point capacity used
- 15) Pricing option 3 - Percentage of system-wide capacity used
- 16) Pricing option 4 – Retail minus
- 17) Pricing option 5 - Percentage of retail revenue
- 18) Pricing option 1 assessment - supply of point-to-point capacity
- 19) Pricing option 2 assessment - percentage of point-to-point capacity used
- 20) Pricing option 3 assessment - percentage of system-wide capacity used
- 21) Pricing option 4 assessment - retail minus
- 22) Pricing option 5 assessment - percentage of retail revenue
- 23) Pricing assessment summary
- 24) Next steps



Telecom sector reform and investment

Reform

- Introduce competition
- Establish independent regulator
- Establish Open Access Entity
- Enable digital society

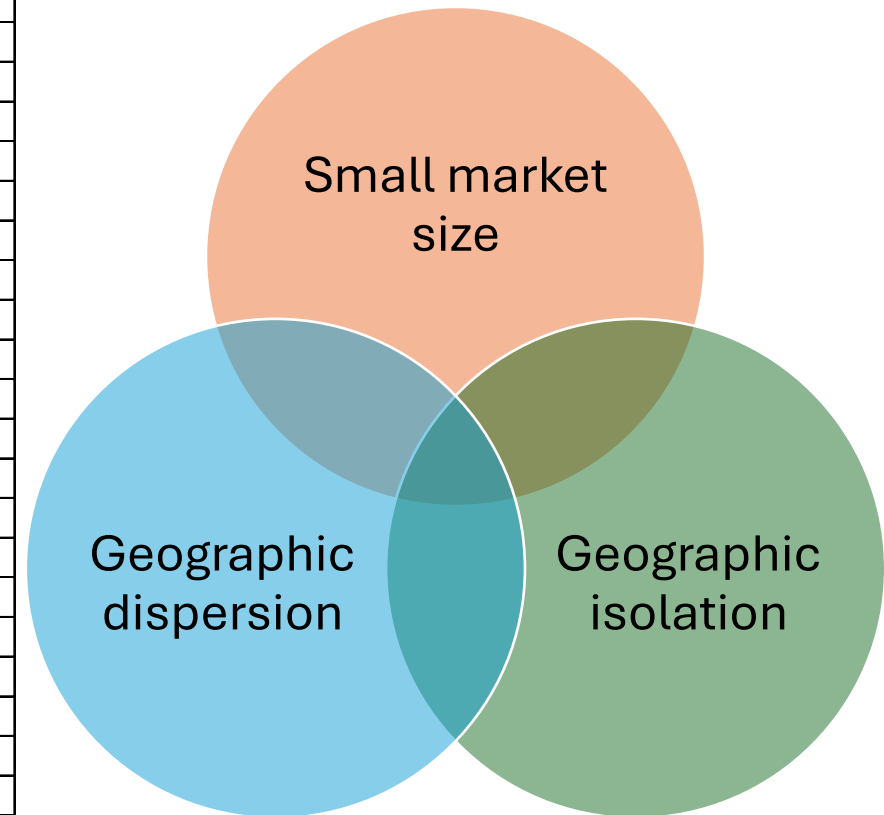
Investment

- Invest in submarine cables
- Invest in nationwide broadband
- Public funding of shared infrastructure

Unique challenges for Small Island Developing States

Island country remoteness and dispersion index - World Bank (2014)			
Jurisdictions with higher numbers are more remote / dispersed			
	Remoteness index	Dispersion index	Remoteness and dispersion index
<i>Pacific (Average)</i>	0.82	0.79	0.80
Fiji	0.89	0.83	0.86
Kiribati	0.78	1.00	0.89
Marshall Islands	0.74	0.91	0.82
Micronesia (FSM)	0.73	0.98	0.85
Palau	0.70	0.70	0.70
Samoa	0.86	0.44	0.65
Solomon Islands	0.83	0.87	0.85
Tonga	0.91	0.72	0.81
Tuvalu	0.84	0.74	0.79
Vanuatu	0.88	0.76	0.82
<i>Caribbean (Average)</i>	0.42	0.28	0.35
Antigua and Barbuda	0.40	0.41	0.40
Bahamas, The	0.37	0.71	0.54
Barbados	0.44	0.50	0.47
Dominica	0.42	0.18	0.30
Grenada	0.45	0.16	0.31
St. Kitts and Nevis	0.40	0,00	0.20
St. Lucia	0.43	0.07	0.25
St. Vincent and the Grenadines	0.44	0.22	0.33
<i>Other (Average)</i>	0.46	0.60	0.53
Cape Verde	0.36	0.75	0.55
Comoros	0.61	0.48	0.54
Maldives	0.58	0.77	0.68
Malta	0.13	0.29	0.21
São Tomé and Príncipe	0.47	0.48	0.47
Seychelles	0.59	0.84	0.71

FSM has one of the most challenging telecom investment markets in the world due to its small GDP, geographic isolation, and geographic dispersion.



FSM Government fiber investment policy

Structural separation

- Separate government-owned wholesale and retail layers
- Introduce competition at retail layer
- Move shareable infrastructure to wholesale layer

Subsidized investment

- Government absorbs all submarine cable capex
- OAE recovers unfunded submarine cable opex from wholesale customers
- Geographically uniform wholesale pricing for access without regard to location, distance or segments used

Wholesale sharing

- All Government-sponsored fiber investment through OAE
- OAE as steward for submarine cables
- Efficient investment and use of all Government-owned infrastructure

FSM Grant-funded submarine cable capex

The FSM Government has provided OAE with USD 62.6 million in initial capital investment without expecting return of capital or any return on invested capital

GoFSM investment	Capex (USD)	Current book value (USD)
Yap Spur	14,500,000	9,500,000
Chuuk-Pohnpei Cable System	20,600,000	18,500,000
HANTRU-1 upgrade	800,000	800,000
East Micronesia Cable System	26,700,000	26,700,000
Total	62,600,000	55,500,000

HANTRU-1 capex

- HANTRU-1 initial FSMTC capital investment funded by RUS loan: USD 12.1 million
- FSM consumers funded USD 3.9 million of HANTRU-1 capex via repayment of RUS-FSMTC Loan
- US Government funded USD 8.2 million of HANTRU-1 capex through forgiveness of unpaid principal on RUS-FSMTC loan

OAE-operated annual submarine cable opex

OAE assets	Annual opex (USD) before EMC RFS
Chuuk cable	320,796
Pohnpei cable	228,612
Yap cable	410,877
5% reserve	48,014
Total	1,008,299

OAE assets	Annual opex (USD) after EMC RFS
Chuuk cable	312,259
Kosrae cable	178,847*
Pohnpei cable	220,353
Yap cable	408,882
5% reserve	56,017
Total	1,176,358

* Kosrae cable opex costs are based on EMC Project Management Unit preliminary cost estimates and are subject to change

OAE-operated submarine cable opex breakdown

Expense	Annual cost (USD)	OAE comment
Overhead Costs	153,597	Does not include grant-funded costs
Common Submarine Costs	159,586	Includes NOC service plus GTA Guam cross-connect
FSM IRU costs	140,621	Identified in Annex B of OAE retail minus pricing methodology
Yap Spur spares storage	27,684	
Chuuk-Pohnpei spares storage	11,305	
Marine maintenance Yap Spur	70,020	OAE intends to submit a request for FSM National Government to cover marine maintenance costs
Marine maintenance Chuuk-Pohnpei	164,472	OAE intends to submit a request for FSM National Government to cover marine maintenance costs
Yap – Guam IRU costs	233,000	OAE is seeking a reduction in this amount
5% reserve	48,014	
Total	1,008,299	

OAE cost recovery requirement

Traditional tariff formula

$$\text{ARR} = \text{OPEX} + \text{ROI} + \text{DEP} + \text{WCA} + \text{TAX}$$

ARR means annual revenue requirement

OPEX means operating expenses other than DEP, interest and TAX

ROI means return on undepreciated asset base

DEP means depreciation on asset base

WCA means working capital allowance as percentage of OPEX

TAX means tax paid by OAE

• Included costs (year 1)

- Annual Opex cost: USD 1,008,299
- Return on investment: USD 2,689,727
- Depreciation: USD 2,781,000
- Working Capital Allowance: USD 0
- TAX: USD 0
- TOTAL: USD 6,479,026

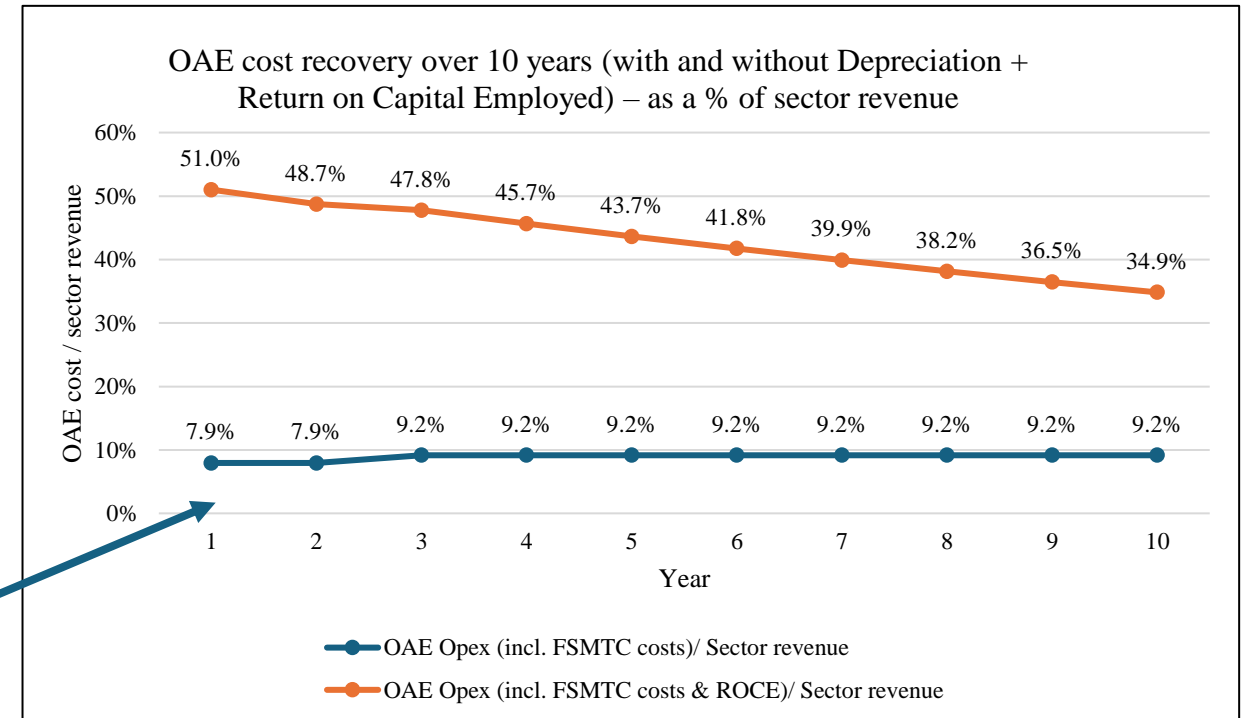
The Partial cost recovery model set by FSM Government significantly reduces OAE's cost recovery requirements

OAE OPEX only tariff formula

$$\text{ARR} = \text{OPEX} + 5\% \text{ reserve}$$

• Included costs

- Annual OPEX Year 1: USD 1,008,299
- Annual Opex Year 10: USD 1,520,815



FSM submarine cable affordability

Affordability of capex + opex + ROI

- Annual OAE costs vs total relevant sector revenue: **from 51% in year 1 to 35% in year 10**
- Capex/revenue ratio of **>200% compared to a norm of around 15%-50%**, which exceeds that which a **business can carry**

Affordability of opex only

- Annual OAE costs vs total relevant sector revenue is **7.9% (pre-EMCS/Kosrae)** and **9.2% (post-EMCS/Kosrae)**

FSM affordability target: 10% of sector revenues

FSM

pop 116,000, sector revenue: USD 17.5 million



Palau Comparison – 23% of sector revenues

Palau

pop 18,000, sector revenue: USD 12.8 million



Kosrae international connectivity affordability

EMC affordability for Kosrae

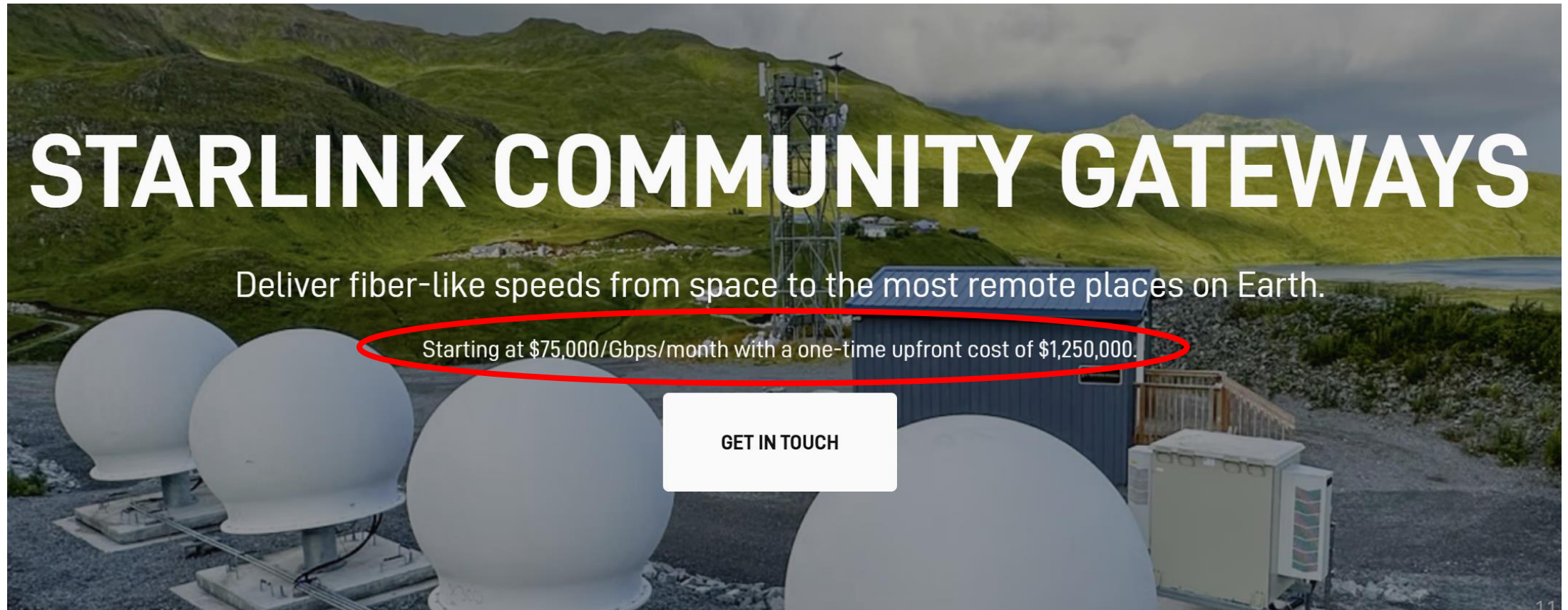
- 100 Gbps capacity
- Grant funded capex of USD 27.6 million
- Annual opex estimated at USD 178,847

OAE EMC Annual Revenue Requirement of USD 178,847

Starlink affordability for Kosrae

- 1 Gbps capacity
- Capex of USD 1.25 million
- Annual opex of USD 900,000

OAE EMC Annual Revenue Requirement of USD 900,000



STARLINK COMMUNITY GATEWAYS

Deliver fiber-like speeds from space to the most remote places on Earth.

Starting at \$75,000/Gbps/month with a one-time upfront cost of \$1,250,000.

GET IN TOUCH

The image shows a Starlink Community Gateway installation in a remote, mountainous area. In the foreground, several large white satellite dishes are mounted on a gravel surface. In the background, there is a blue metal structure, likely a gateway unit, and a utility box. The landscape consists of green, rolling hills under a cloudy sky.

OAE annual revenue recovery requirements by point-to-point link

Link	A: Capex return plus opex tariff	B: Opex only tariff	Estimated relevant sector revenue	Affordability (A) % of sector revenue	Affordability (B) % of sector revenue
Yap-Guam	USD 1,619,573	USD 410,877	USD 1,839,291 ²	88%	22.3%
Chuuk-Pohnpei	USD 2,088,198	USD 320,796	USD 4,319,819 ³	48%	7.4%
Pohnpei-Guam	USD 1,378,693	USD 251,532	USD 5,603,244 ⁴	24.6%	4.5%
Kosrae-Pohnpei	USD 2,407,638	USD 178,847	USD 802,022 ⁵	300%	22.2%

Cable costs for each link do not increase until capacity limit reached

Notes:

1. Pohnpei-Guam capex plus opex tariff revenue recovery requirement includes USD 991,000 annual amortization cost for HANTRU-1
2. Affordability of Yap-Guam link based on Yap State share of relevant FSM telecommunication revenues
3. Affordability of Chuuk-Pohnpei link based on Chuuk State share of relevant FSM telecommunication revenues
4. Affordability of Pohnpei-Guam link based on Pohnpei State share of relevant FSM telecommunication revenues
5. Affordability of Kosrae-Pohnpei link based on Kosrae State share of relevant FSM telecommunication revenues

Pricing principles

Pricing policy is important because it steers the market towards government's fiber policy objectives

1. Geographically uniform pricing

- Geographically uniform pricing for access without regard to location, distance or segments used
- Current market practice

2. Competitive neutrality

- All retail operators have opportunity to compete on level playing field
- Fair allocation of costs among retail operators

3. No rationing of capacity

- Unlimited bandwidth for the near and medium term
- Policy to encourage uptake of more bandwidth to develop digital economy

4. Ease of administration

- Availability of information to OAE
- Complexity of calculation
- Avoid need for recurring adjustments to rates
- Administrative simplicity and transparency

Pricing options

1. Supply of point-to-point capacity

- Charges based on capacity provisioned on each link
- Prices based on revenue recovery requirements for each link

2. Percentage of point-to-point capacity used

- OAE would measure operator traffic on each link and allocate charges based on actual volume of traffic transmitted per link

3. Percentage of system-wide capacity used

- OAE would measure operator traffic system-wide and allocate charges based on actual volume of traffic transmitted by each operator

4. Retail minus

- OAE would charge operators based on the percentage of relevant cable costs incumbent uses to provide retail services

5. Percentage of retail revenue

- OAE would allocate costs according to operator's percentage of gross revenues from provision of retail services
- Adjustments

Alternative minimum price

Under retail minus or percentage of retail revenue pricing all operators may pay a minimum flat rate price per month

Pricing option 1 - Supply of point-to-point capacity

1. Supply of point-to-point capacity

Pricing Metric: Provisioned Capacity on each link

$$\text{Price for Operator } a = \frac{PM_a}{PM_a + PM_b + PM_c} \times \text{OAE Link Revenue Requirement}$$

- Charges applied for each link used
- Based on capacity provisioned on each link
- Prices based on apportioning opex costs for each link based

PM_a = Pricing Metric applied to operator a
 PM_b = Pricing Metric applied to operator b
 PM_c = Pricing Metric applied to operator c

Pricing option 2 - Percentage of point-to-point capacity used

2. Percentage of point-to-point capacity used

Pricing Metric: Volume of capacity used on each link

$$\text{Price for Operator } a = \frac{PM_a}{PM_a + PM_b + PM_c} \times \text{OAE Link Revenue Requirement}$$

- Charges applied for each link used
- Based on actual volume used on each link (total bits over billing period)
- Prices based on apportioning opex costs for each link

PM_a= Pricing Metric applied to operator a
PM_b= Pricing Metric applied to operator b
PM_c= Pricing Metric applied to operator c

Pricing option 3 - Percentage of system-wide capacity used

3. Percentage of system-wide capacity used

Pricing Metric: Volume of capacity used system-wide

$$\text{Price for Operator } a = \frac{PM_a}{PM_a + PM_b + PM_c} \times \text{OAE system-wide Revenue Requirement}$$

- Charges applied system-wide
- Based on actual volume used system-wide (total bits over billing period)
- Prices based on apportioning total OAE opex costs

PM_a= Pricing Metric applied to operator a
PM_b= Pricing Metric applied to operator b
PM_c= Pricing Metric applied to operator c

Pricing option 4 - Retail minus

5. Retail minus

Pricing Metric: Per-customer charge based on incumbent use of cable to provide service

Price for Operator a = $(N_{consumer} \times PM_{consumer}) + (N_{commercial} \times PM_{commercial})$

Details set out in Annex A of OAE retail minus pricing methodology

1. Determine incumbent net relevant revenues
2. Determine OAE costs
3. Calculate OAE's percentage cost contribution to incumbent's relevant revenues
4. Determine benchmark incumbent-offered retail prices
5. Determine retail-minus wholesale price by applying OAE's cost contribution percentage to the benchmark incumbent retail residential and enterprise fixed Internet offered prices

- Charges applied based on number of operator's retail customers
- Based on the percentage of relevant cable costs incumbent uses to provide retail services

$N_{consumer}$ =Number of operator a's consumer customers

$N_{commercial}$ =Number of operator a's commercial customers

$PM_{consumer}$ = Retail minus per-customer charge for consumers

$PM_{commercial}$ = Retail minus per-customer charge for commercial customers

Pricing option 5 - Percentage of retail revenue

4. Percentage of retail revenue





Pricing Metric: Operator gross revenues derived from provision of retail services

$$\text{Price for Operator } a = \frac{PM_a}{PM_a + PM_b + PM_c} \times \text{OAE system-wide Revenue Requirement}$$





- Charges applied system-wide
- Based on operator gross revenues derived from provision of retail services
- Adjustments

PM_a= Pricing Metric applied to operator a
PM_b= Pricing Metric applied to operator b
PM_c= Pricing Metric applied to operator c





Pricing option 1 assessment - supply of point-to-point capacity

Pricing principle	Assessment	Comment
1. Geographically uniform pricing		<ul style="list-style-type: none">• Charges vary based on revenue requirements for each link• Service to some states will require capacity on more than one link
2. Competitive neutrality		<ul style="list-style-type: none">• Large minimum capacity purchase favors larger operators
3. No rationing of capacity		<ul style="list-style-type: none">• Operators may ration as usage approaches cap
4. Ease of administration		<ul style="list-style-type: none">• Not clear how Pohnpei-Guam should be charged





Pricing option 2 assessment - percentage of point-to-point capacity used

Pricing principle	Assessment	Comment
1. Geographically uniform pricing		<ul style="list-style-type: none">• Charges vary based on costs for each link• Service to some states will require capacity on more than one link
2. Competitive neutrality		<ul style="list-style-type: none">• Cost of wholesale capacity relative to operator size in each state• Pricing may be dependent on network design
3. No rationing of capacity		<ul style="list-style-type: none">• May result in rationing• Operators gain competitive advantage by using less capacity
4. Ease of administration		<ul style="list-style-type: none">• Difficult to accurately measure• Not clear how Pohnpei-Guam should be charged• Some traffic will be double or triple counted





Pricing option 3 assessment - percentage of system-wide capacity used

Pricing principle	Assessment	Comment
1. Geographically uniform pricing		<ul style="list-style-type: none">• Charges not based on per-link costs• Service to some states will require capacity on more than one link
2. Competitive neutrality		<ul style="list-style-type: none">• Cost of wholesale capacity relative to operator size• Pricing may be dependent on network design• Operators located in states that require capacity on more than one link at competitive disadvantage
3. No rationing of capacity		<ul style="list-style-type: none">• May result in rationing• Operators gain competitive advantage by using less capacity
4. Ease of administration		<ul style="list-style-type: none">• Not clear how Pohnpei-Guam should be charged• Some traffic will be double or triple counted





















Pricing option 4 assessment - retail minus

Pricing principle	Assessment	Comment
1. Geographically uniform pricing		<ul style="list-style-type: none">• Charges not based on per-link costs
2. Competitive neutrality		<ul style="list-style-type: none">• Cost of wholesale capacity relative to operator size
3. No rationing of capacity		<ul style="list-style-type: none">• No rationing of capacity• Operators have no incentive to restrict capacity
4. Ease of administration		<ul style="list-style-type: none">• Adjusting wholesale prices when incumbent changes retail prices will be difficult, always in arrears, and permit strategic behavior• Lose flexibility for new entrants that may offer services that don't match incumbent services• Need accurate information• Need to identify retail revenues that use cable

Pricing option 5 assessment - percentage of retail revenue

Pricing principle	Assessment	Comment
1. Geographically uniform pricing		<ul style="list-style-type: none">• Charges not based on per-link costs
2. Competitive neutrality		<ul style="list-style-type: none">• Cost of wholesale capacity relative to operator size
3. No rationing of capacity		<ul style="list-style-type: none">• No rationing of capacity• Operators have no incentive to restrict capacity
4. Ease of administration		<ul style="list-style-type: none">• Need accurate information• Need to identify retail revenues that use cable

Pricing assessment summary

	Pricing model	Geographically Uniform pricing	Competitive neutrality	No rationing of capacity	Ease of administration
1.	Point-to-point capacity supplied				
2.	Percentage of point-to-point capacity used				
3.	Percentage of system-wide capacity used				
4.	Retail minus				
5.	Percentage of retail revenue				

Next steps



- This presentation and other OAE updates will be posted on the OAE website
- We will send all licensed operators a questionnaire to provide written feedback