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Affordable Connectivity from the Skies

A Subsidy-Aware Pricing Framework for Satellite Services under Public Budget Constraints

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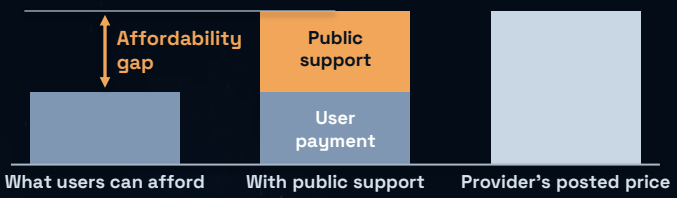
Motivation

85.4% urban **58.2%** rural

Internet use, 2025 [1]

Satellites can cover, but **coverage ≠ access**

Research question: How can public support bridge an affordable payment and a provider-sustainable price without overspending in a resource-limited network?

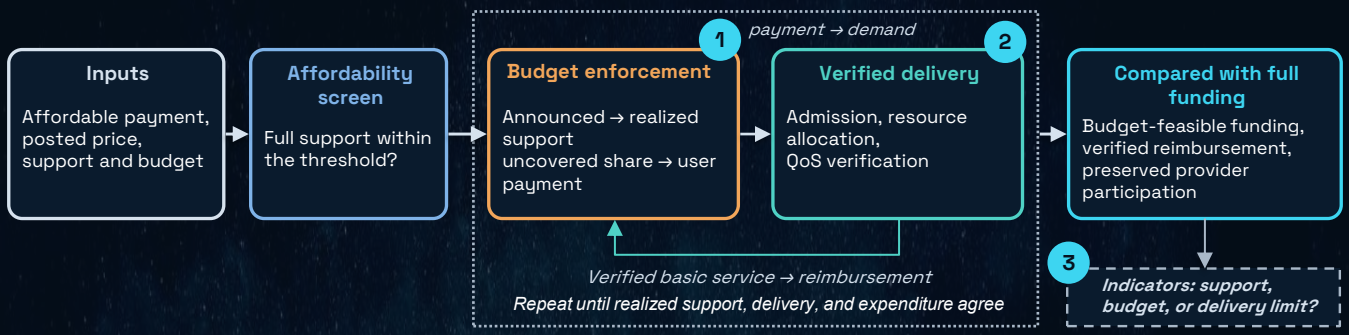


Without support, delivered service stays unaffordable

[1] ITU DataHub: World Telecommunication/ICT Indicators, 2025.

What is innovative?

A unified framework connects regional affordability, provider-sustainable prices, the public budget, and verified NTN delivery, which prior studies do not jointly connect.

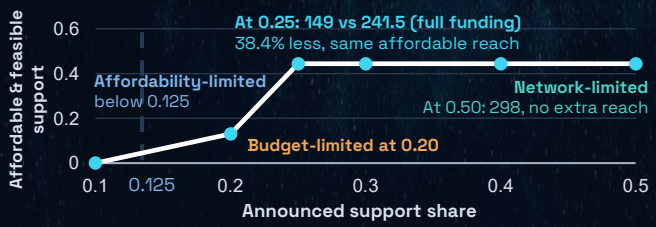


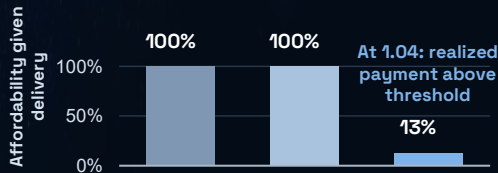
1 **Budget-feasible support:** announced support scaled to what the budget can fund

2 **Verified reimbursement:** contributions only for verified eligible basic service

3 **Bottleneck diagnosis:** distinguishes support, funding, and delivery limits

Results





Basic posted price	0.88	**0.96 (ref.)**	1.04
Economic return	178	**259**	339 (+90% vs 0.88)
Expenditure per affordable outcome	2.06	**2.25**	**23.94 (>10×)**

Controlled proof of concept · 100 paired realizations · normalized monetary units

Policy response to each limitation

Affordability-limited	Revise support design
Budget-limited	Reconsider funding, eligibility, or package scope
Network-limited	Pursue capacity or infrastructure, not more subsidy

How does it relate to sustainability?

Public-budget discipline	Government pays only for verified service; **38.4% lower public expenditure than full funding, same affordable reach**
Provider participation	Provider receives the full posted price for verified service
Social inclusion	Eligible users get payment relief when support is realized; **100% of delivered basic service affordable at the reference price**

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