Municipal Wireless Economics

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Wireless and Digital Cities

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Four Layer Municipal Wireless Business Model

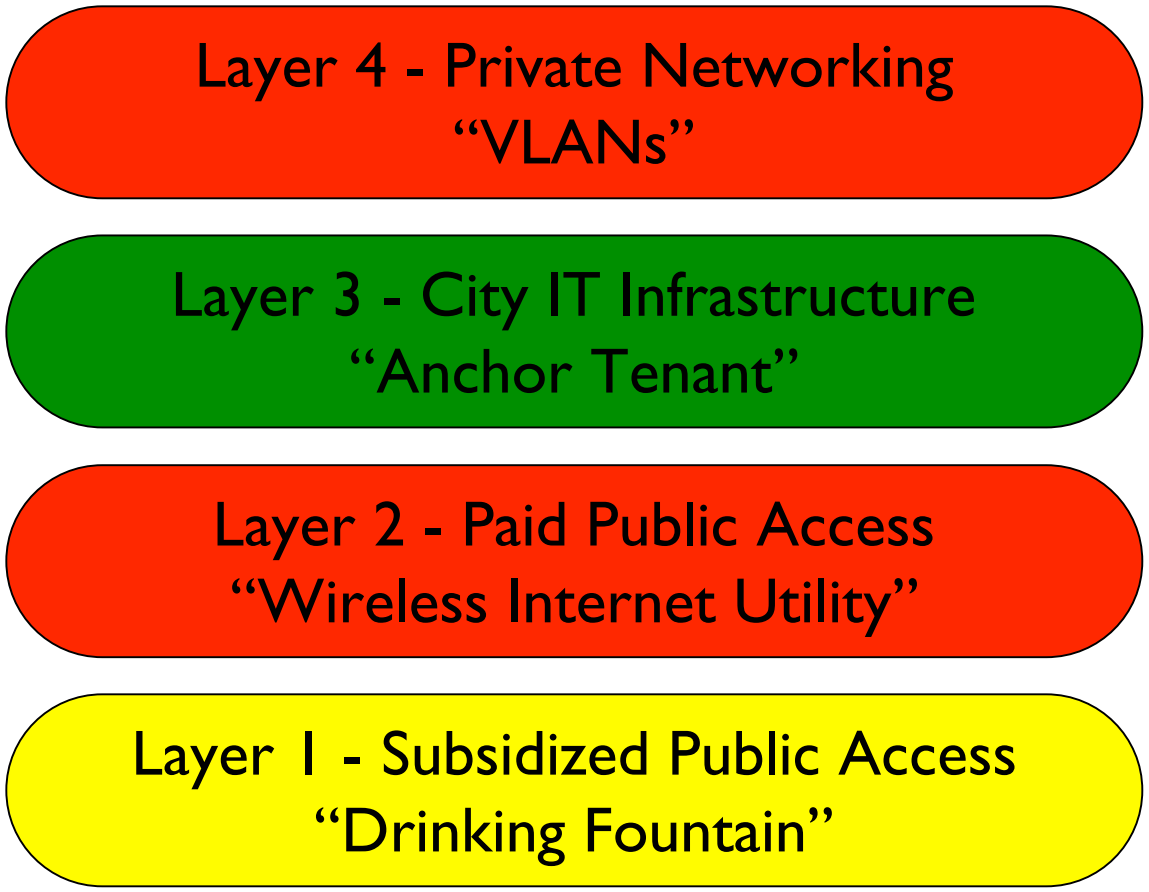
Layer 4 - Private Networking
"VLANs"

Layer 3 - City IT Infrastructure
"Anchor Tenant"

Layer 2 - Paid Public Access
"Wireless Internet Utility"

Layer 1 - Subsidized Public Access
"Drinking Fountain"

Four Layer Municipal Wireless Business Model



Partners needed first

Verifiable revenue

Special cases only

Provable benefit

Limited & free: sustainable cost, happy taxpayers

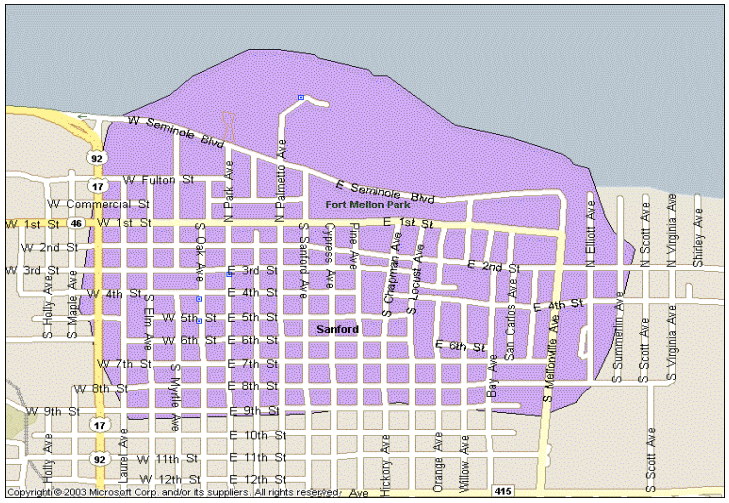
Layer 1 - Subsidized Public Access "Drinking Fountain"

City of Folsom, California

- Free WiFi access at City parks, sports facilities
- WiMAX backbone doubles as economic development test bed
- Isolated & prioritized use of existing City network
- Partnership with Intel Corp.

City of Sanford, Florida

- Free WiFi in business district
- Simple, robust, super low opex
- Paid via City's ad budget: cheap publicity for economic development



Source: TVA, City of Sanford

Community Wireless Corp. in East Palo Alto

Layer 1 - Subsidized Public Access "Drinking Fountain"

St Francis Assisi Boys Club

I Have a Dream (job placement)

St Vincent de Paul Food Closet

Foundation for College Education

Rational digital divide strategy

- Cellular design meets needs at far lower cost than mesh
- Service provided where equipment, support are available
- Limited, achievable, sustainable

Source: Stu Jeffery, Seena Networks

Private sector a bad match for muni backbone

Layer 4 - Private Networking "VLANs"

3 cities + 3 partners x 0 VLANs = 3 failures, of many…

Philadelphia & Earthlink

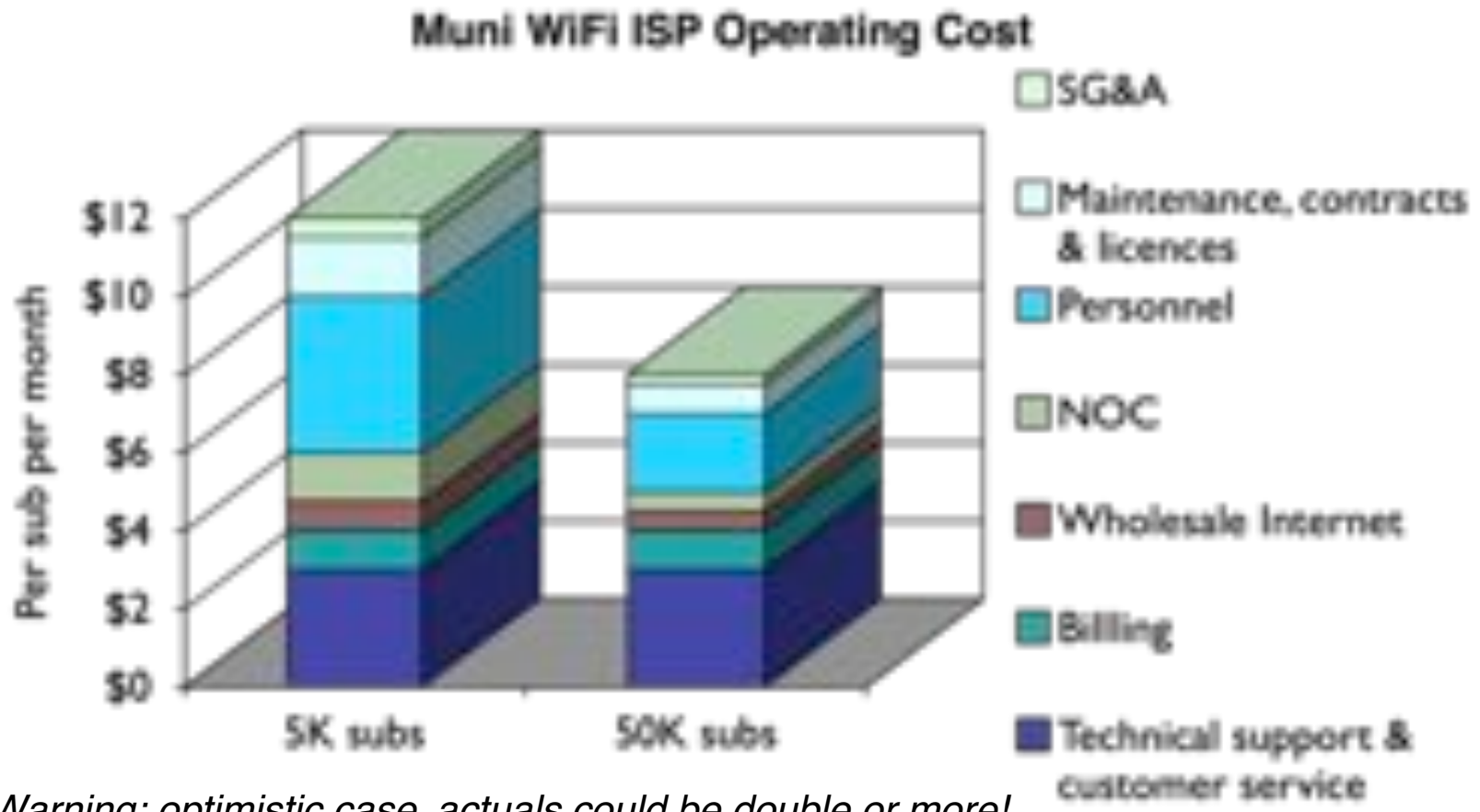
Portland & MetroFi

Colorado Springs & SkyTel

Corporate networks have no use for wireless facilities limited by municipal boundaries

Small scale, high operating costs

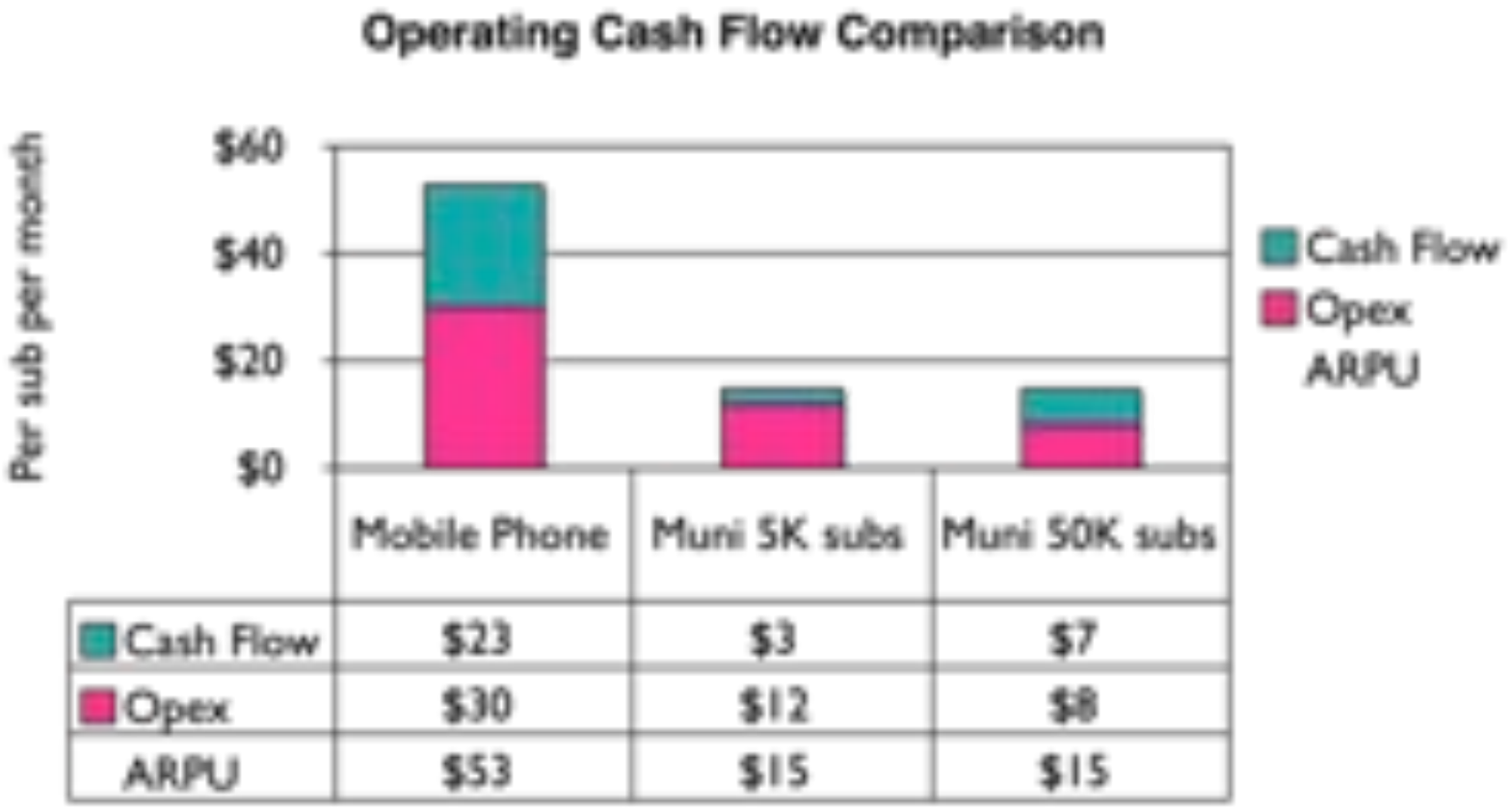
Layer 2 - Paid Public Access "Wireless Internet Utility"



Warning: optimistic case, actuals could be double or more!

Not much left over at the end of the month

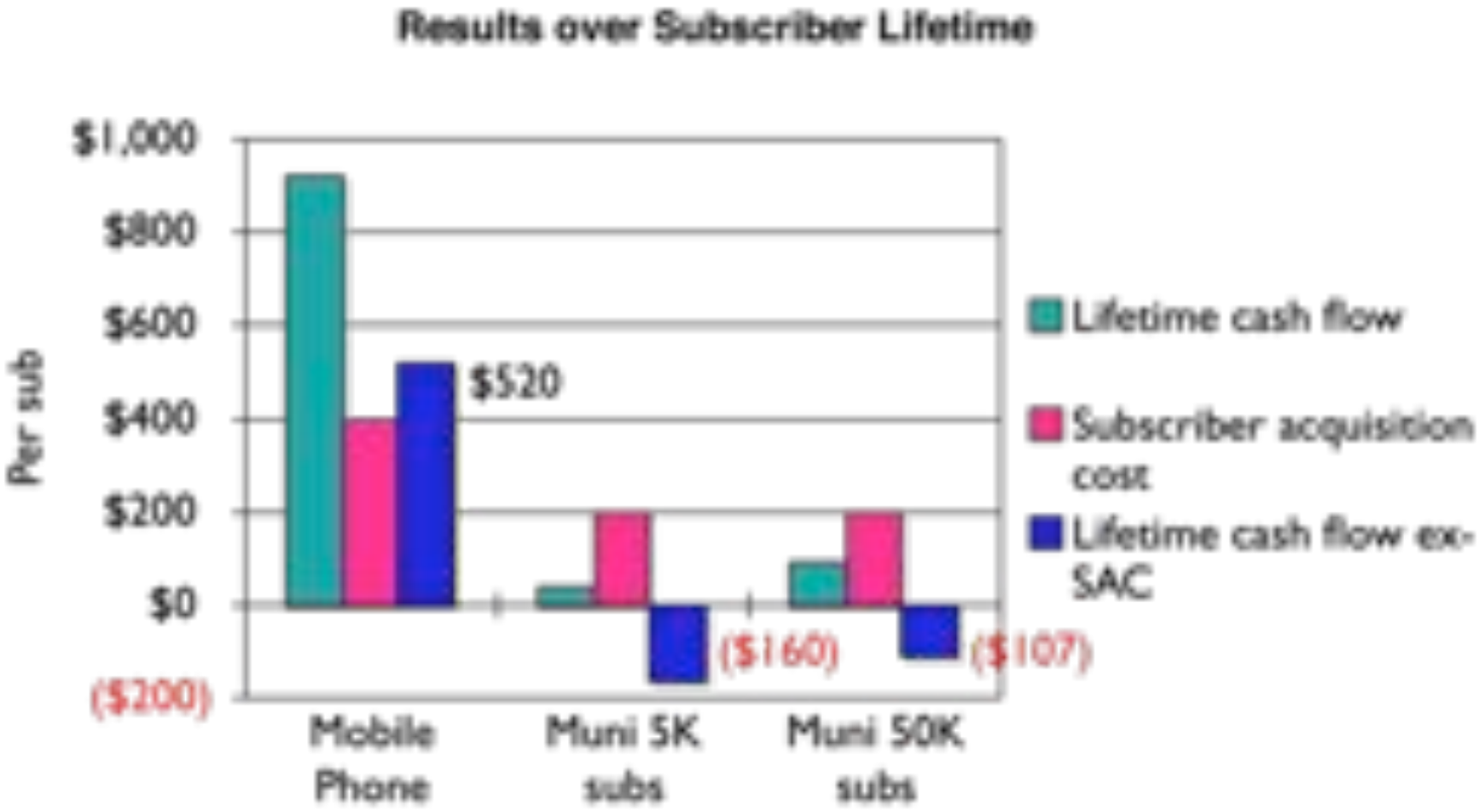
Layer 2 - Paid Public Access "Wireless Internet Utility"



	Mobile Phone	Muni 5K subs	Muni 50K subs
Cash Flow	$23	$3	$7
Opex	$30	$12	$8
ARPU	$53	$15	$15

Muni WiFi loses, even before considering Capex

Layer 2 - Paid Public Access "Wireless Internet Utility"



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Competitive advantages create the death spiral

Layer 2 - Paid Public Access "Wireless Internet Utility"

	Muni WiFi	DSL
Availability	85%	95% ✓
Speed	500K	750K ✓
Consistency	Low	High ✓
Reliability	90%	99.99% ✓
Monthly cost	$15 ✓	$20
Minimum term	None ✓	1 Year
Credit check	No ✓	Yes

Muni WISP service appeals to residential customers…

- With low discretionary income
- With poor credit
- Who can't or won't plan a year ahead

Churn rate climbs near 100% per year, which is unsustainable

Annual subsidy (before Capex):

5K subs - $ 720,000

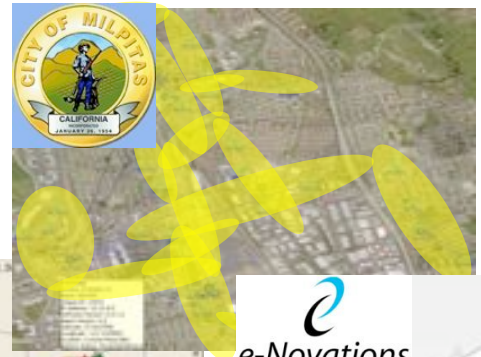
50K subs - $ 4,800,000

Government serves everyone, but choice of service determined by policy and politics, not first-order ROI

Cities can find ROI in IT & telecom budgets

Layer 3 - City IT Infrastructure "Anchor Tenant"

Link police, fire vehicles into IT resources



Connect remote utility facilities to IT network

Direct video from ambulances to ERs

Extend network to airport, cheaper than fiber

Once core network is supported by cost savings, efficiency gains or budgeted service improvements, the business case for other layers improves…

Source: Cities of Milpitas, Tucson, Fredericton, Folsom

If IT-centric network can cover fixed costs…

Layer 3 - City IT Infrastructure "Anchor Tenant"

Layer 4 - Private Networking
"VLANs"

Economics improve, but corporations still don't need it

Layer 2 - Paid Public Access
"Wireless Internet Utility"

Subsidized service for targeted communities might be affordable

Layer 1 - Subsidized Public Access
"Drinking Fountain"

Low cost strategy is even cheaper

New muni wireless networks designed for IT needs are likely to use 4G technology, which has added benefits…

WiMAX, LTE overcome cost & reliability issues

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Cheap and robust enough for point to point and/or ad hoc

If reliability reduces churn to mobile levels, biz case looks possible

Facilities-based (East Palo Alto) strategy simple

4G promises to combine mass market cost structure with fast, reliable, purpose-designed architecture

But broken promises have cost millions

Layer 1 - Subsidized Public Access "Drinking Fountain" | Layer 2 - Paid Public Access "Wireless Internet Utility" | Layer 3 - City IT Infrastructure "Anchor Tenant" | Layer 4 - Private Networking "VLANs"

Checklist for wireless planning success

- ✓ Only use wireless when it offers a unique advantage
- ✓ Define and limit objectives: build a network, don't save the world
- ✓ Learn the hard cash value of a network and prepare to pay for it
- ✓ Respect the laws of physics and economics
- ✓ Understand the difference between IT and RF
- ✓ Ignore cheerleaders: always be skeptical

'What are the facts? Again and again and again--what are the facts? Shun wishful thinking, ignore divine revelation, forget what "the stars foretell," avoid opinion, care not what the neighbors think, never mind the unguessable "verdict of history"--what are the facts, and to how many decimal places? You pilot always into an unknown future; facts are your single clue. Get the facts!' RAH

Back-up Slides

Business model data

	U.S. Mobile Benchmarks	Muni WISP, 5K subs	Muni WISP, 50K subs
ARPU	$53	$15	$15
Churn (monthly)	2.50%	7.50%	7.50%
SAC	$400	$200	$200
Operating Cost to Maintain a Subscriber			
Variable Cost			
Technical support & customer service		$3.00	$3.00
Billling		$1.00	$1.00
Subtotal		$4	$4
Allocated Fixed Cost			
Wholesale Internet		$0.75	$0.50
NOC		$1.25	$0.50
Personnel		$4.00	$2.00
Maintenance, contracts & licences		$1.50	$0.75
SG&A		$0.50	$0.25
Subtotal		$8	$4
Total	$30	$12	$8
Monthly operating cash flow	$23	$3	$7
Average subscriber lifetime (months)	40	13	13
Lifetime subscriber cash flow	$920	$40	$93
Lifetime cash flow after SAC	$520	($160)	($107)
Monthly subsidy per sub		$12	$8
Annual System Operating Subsidy		$720,000	$4,800,000

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Stephen Blum is president of Tellus Venture Associates®, a business development and market analysis consultancy for the digital media and telecommunications industries. He is a 30-year industry veteran and recognized as an expert in developing new wireless and fiber optic broadband systems, and satellite broadcasting platforms and services. His accomplishments include playing key roles in the development and launch of:

- DirecTv and other DBS systems worldwide
- The first satellite radio broadcasting systems
- North America's first municipal WiMax system
- One of the first municipal WiFi systems
- Fiber optic systems for private communities

He is the author of seven books on the Internet and satellite broadcasting and is a frequent contributor to professional journals and industry events.

Located on California's Monterey Peninsula, Tellus Venture Associates serves municipalities, private communities, start-up companies and large corporations in North and South America, Europe, Africa, Asia and the Pacific Rim.

Blum is Vice President *ex officio* of the Society of Satellite Professionals International, a member of the New Zealand Wireless and Broadband Forum, a member of the Rotary Club of Monterey Pacific and a past Vice President of the World Affairs Council of the Monterey Bay Area. He serves on several new venture advisory boards in the Silicon Valley and Monterey Bay Area. He holds an A.B. in History from the University of California, Berkeley, an M.A. in East Asia Studies from the University of Washington, and an M.B.A. from the University of St. Thomas, and has received several major professional honors, including the PRSA Silver Anvil and the Ellen B. Scripps Fellowship. He is a nationally ranked triathlete and a multiple Ironman finisher.