CITY of PALO ALTO

Market Analysis Report
User-Financed FTTP Model

Tellus Venture Associates

- City provides wholesale transport services to ISPs via active Ethernet system.

- Optimistic assumptions regarding costs and technology.

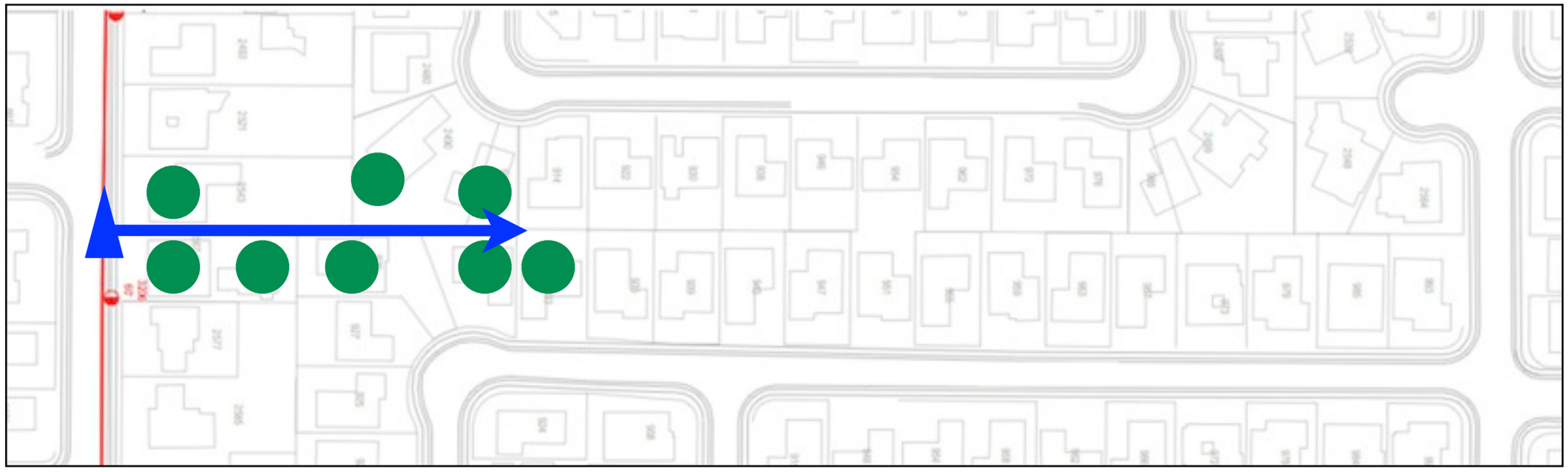
- Wide range of possible take rates considered, based on RKS research.

- Base case assessed on take rates ranging from less than 1% to 21%.

- Competitors not factored in, but they have a head start on meeting this demand.

Cost and technology assumptions largely based on past studies

Business model minimizes City's costs and risk

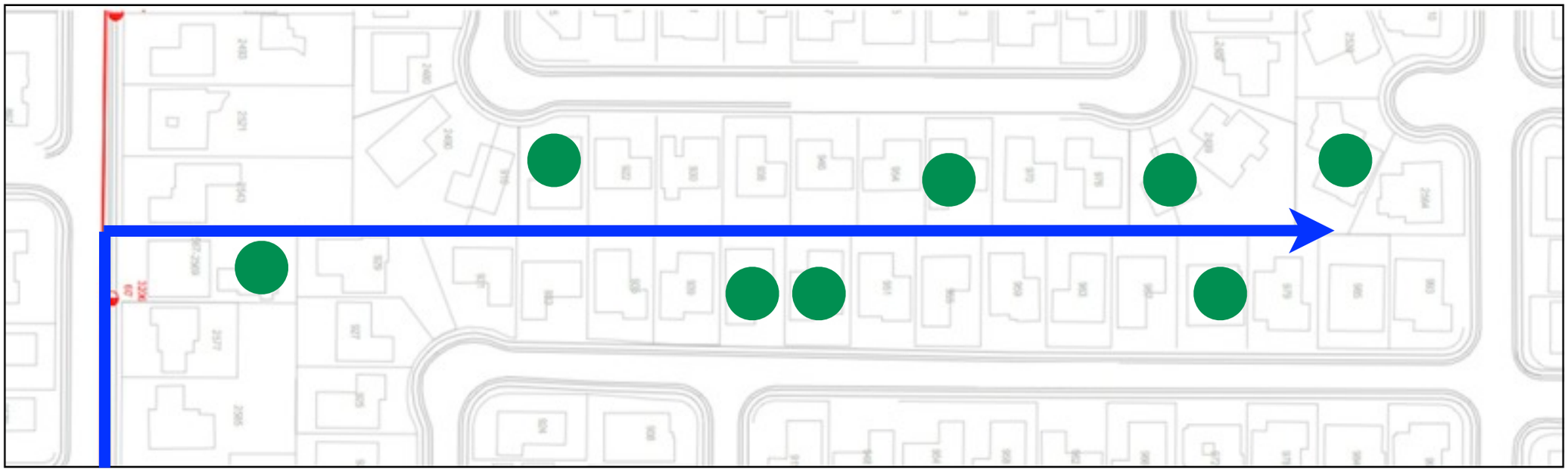


Construction cost: $23,000

(including drops & share of node)

Tight cluster of subscribers next to a node makes the "Perfect" case

At $3,000 each, eight subs would pay for construction costs

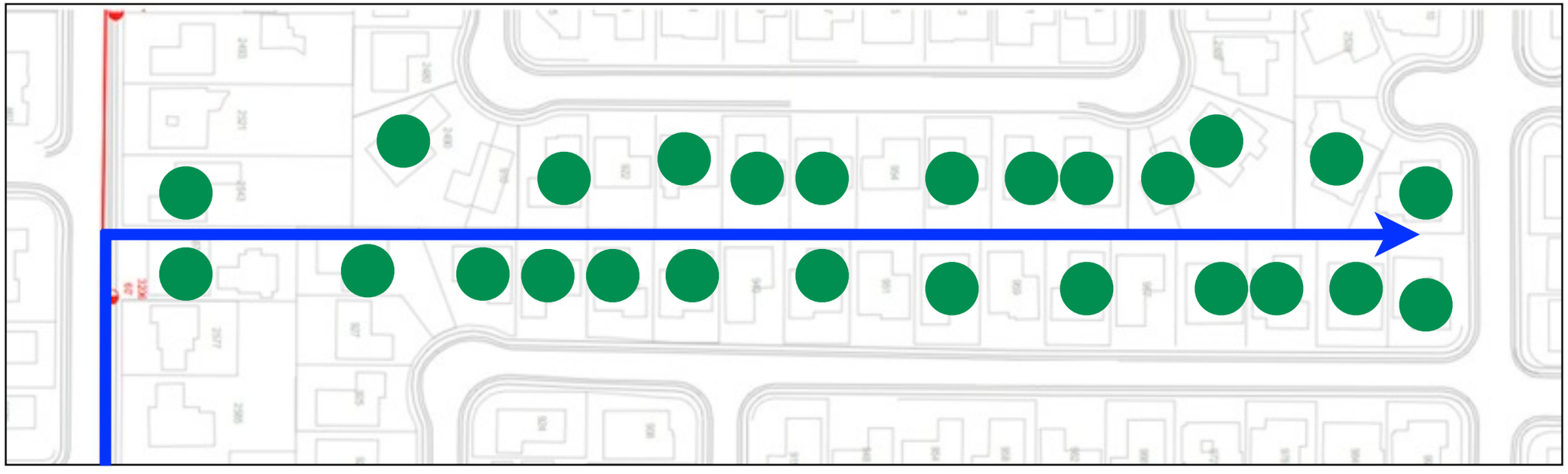


Construction cost: $67,000

(including drops & share of node)

Random distribution on a typical block a more realistic, "Average" case

Eight subs at $3,000 wouldn't even pay half the cost



Construction cost: $78,000

(including drops & share of node)

Twenty-six subs at $3,000 needed to recover Average case costs

A take rate of 79% is unattainable

Chart 5.1 Base Model Alternatives – Operating Results

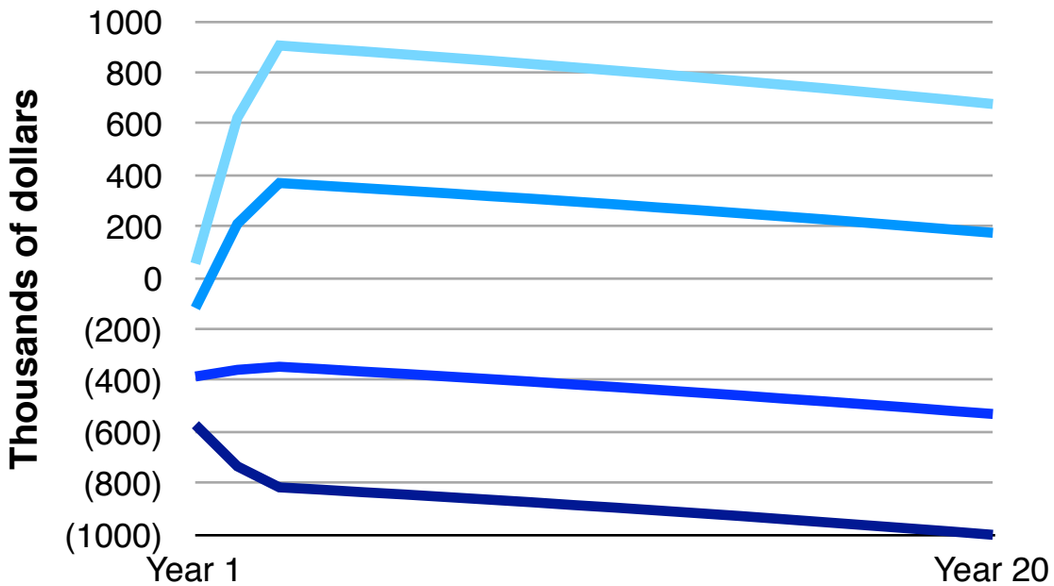
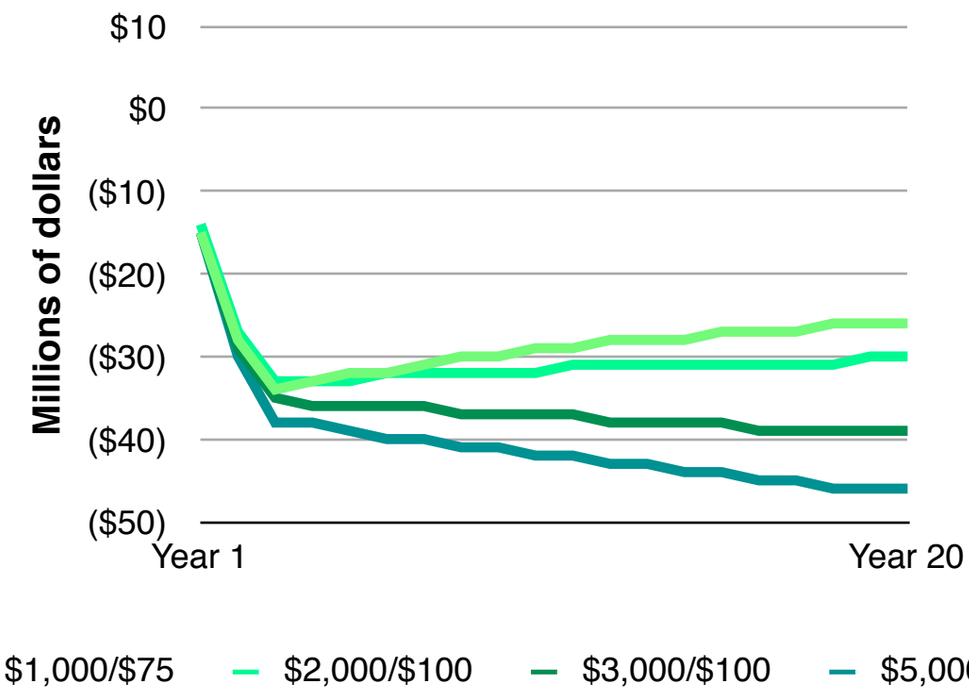


Chart 5.2 Base Model Alternatives – Net Present Value



Could a citywide system pay for itself if operating revenue is added?

Some base model scenarios produce surpluses but not enough

Chart 5.12 Base Model with $12M/$2M Subsidies & 5% Annual Growth – Net Present Value

What would it take to make user-financed FTTP pay for itself?

Aggressive, continuous growth & subsidies from dark fiber. Maybe.

- A fully user-financed citywide fiber-to-the-premise system is not possible to achieve in Palo Alto.

- An opt-in FTTP system can be built using a combination of upfront user fees and City financing.

- There is very little probability of the debt incurred being repaid through operations.

- Ongoing subsidies would be required, very likely in excess of the surpluses currently generated by the CPAU dark fiber system.

Questions?

Backup Slides

Table 3.1 – Capital cost metrics and estimates

Item	Amount	Basis
Total passable parcels	20,879	180 Connect
Average parcels per block	33	180 Connect and map data
Average new system fiber feet required per parcel	53	180 Connect
Fiber installation cost per foot	$28.48	180 Connect and CPAU
Fiber drop and equipment per home	$622	180 Connect
Cost of building a node	$90,000	CTC and TVA research
Maximum nodes needed to cover City	87	CTC
Blocks served by one node	7	Calculation
City inside plant	$140,000	TVA research
Project design and management, as a percentage of direct construction costs	10%	TVA research

Capital cost assumptions

Optimistic assumptions were made about costs & technology

Table 3.2 – Operating cost estimates

Item	Amount	Basis
Fiber plant maintenance, per route mile per year	$1,000	Small, urban system costs
Node and site operations, per location per year	$1,200	Electrical and physical maintenance costs
Network operations per year	$60,000	Outsourcing estimate
Active plant maintenance per year	3%	Percentage of capital cost
Interconnect per year	$30,000	Shared facilities estimate
Subscriber equipment maintenance per year	$4,500	Peer systems
Personnel per year	$238,000	CPAU costs, based on total 2 FTEs spread over 5 positions
Sales, general and administrative	$55,000	Peer systems

Operating cost assumptions

Optimistic assumptions were made about costs & technology

Table 3.3 Demand for user-financed FTTP in Palo Alto

	Upfront fee	$1,000	$2,000	$3,000	$5,000
	Monthly fee	$75	$100	$100	$100
Base case		21.2%	10.6%	4.3%	0.5%
Pessimistic scenario		13.2%	6.6%	2.7%	0.3%
Optimistic scenario		39.7%	19.9%	8.0%	0.9%

Range of take rates considered

Pessimistic interpretation probably closest to reality

Chart 5.3 Pessimistic Scenario – Operating Results

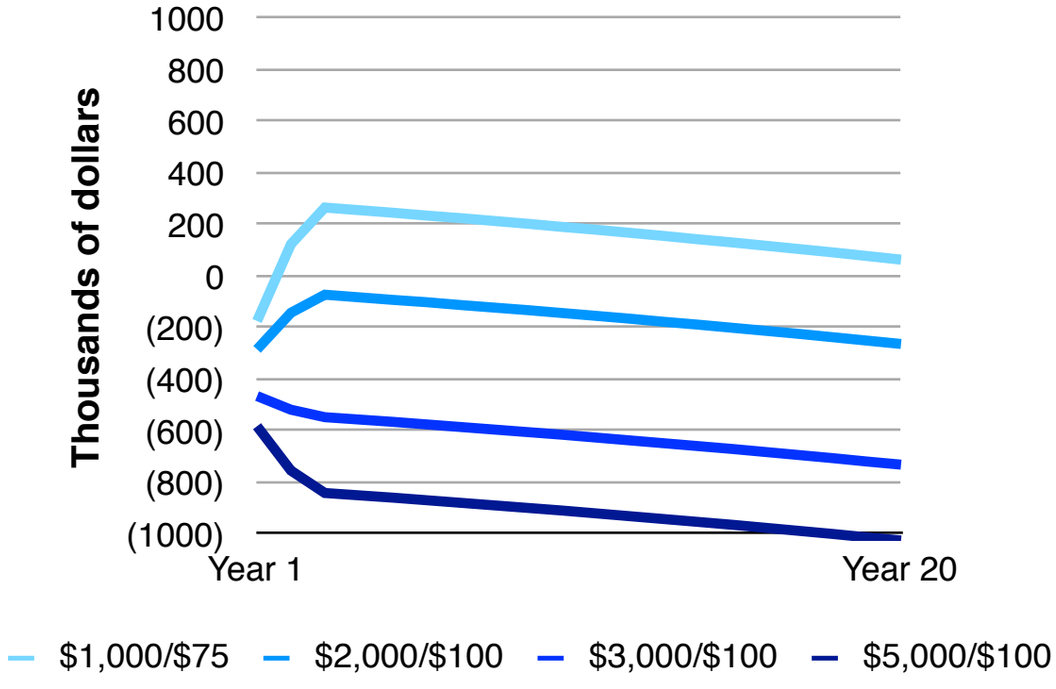


Chart 5.4 Pessimistic Scenario – Net Present Value

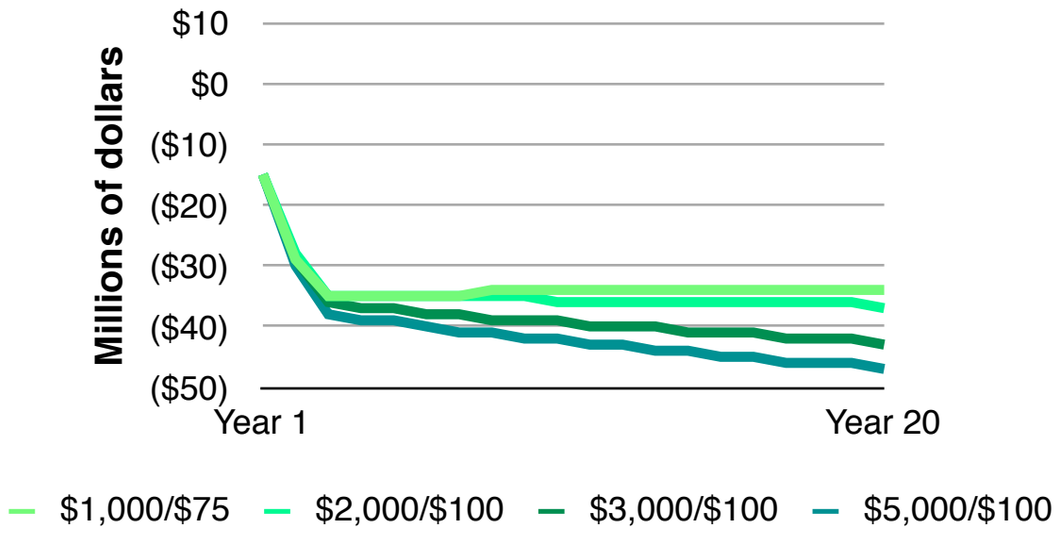


Chart 5.5 Optimistic Scenario – Operating Results

Chart 5.6 Optimistic Scenario – Net Present Value

Optimistic and pessimistic demand scenarios

Results shift but bottom line remains same: negative NPV

Chart 5.7 Base Case with 5% Annual Subscriber Growth – Net Present Value

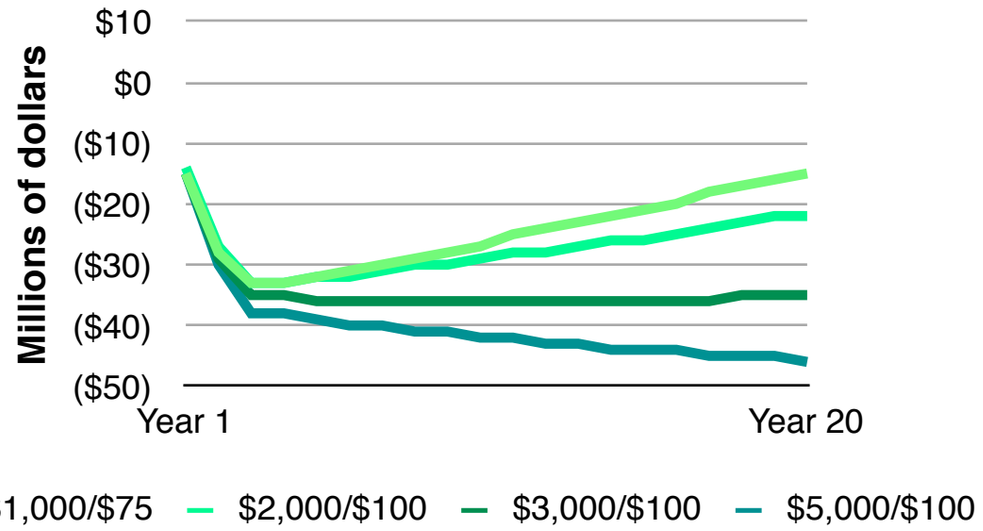
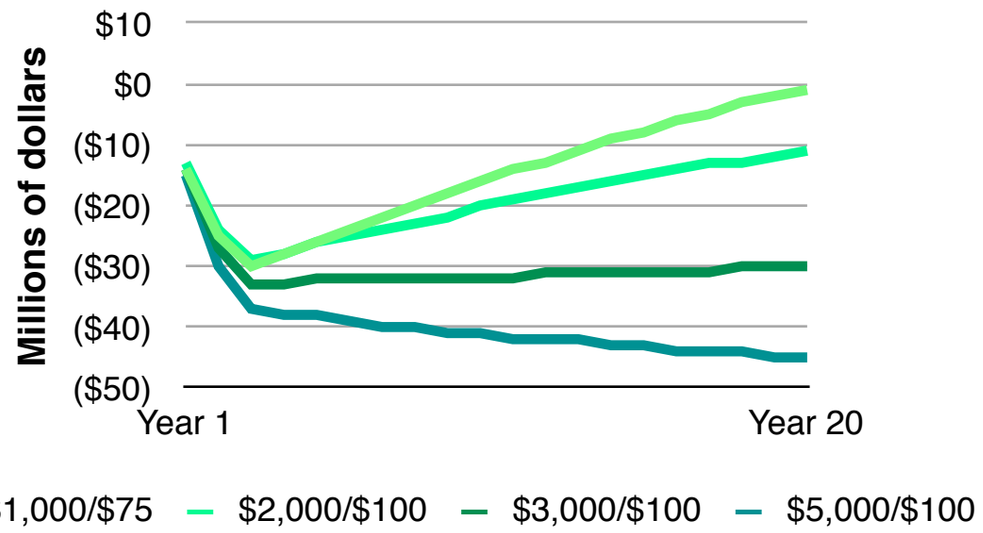


Chart 5.8 Optimistic Scenario with 2% Annual Subscriber Growth – Net Present Value



Continuous growth assumptions

Not sufficient to produce positive NPV in 20 years

Chart 5.9 Base Model with $10M/$1M Subsidies – Net Present Value

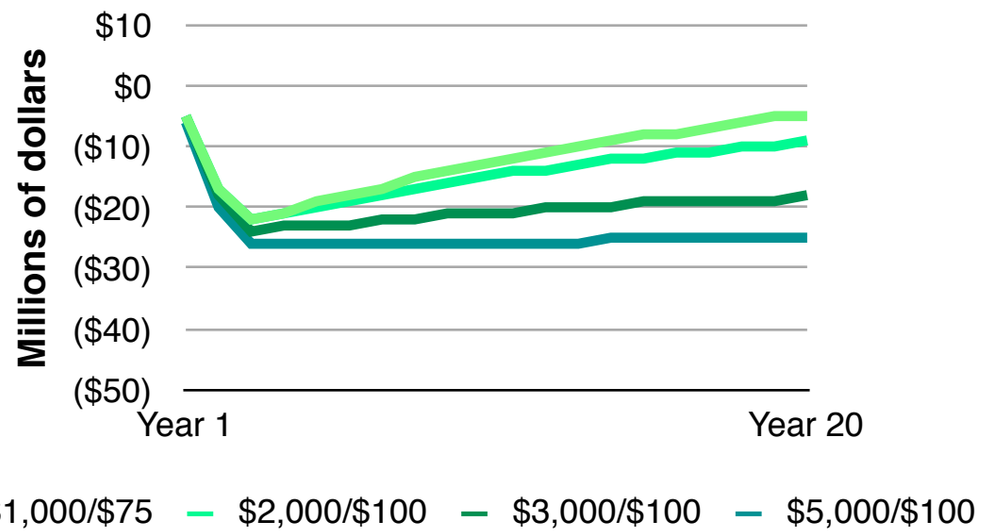
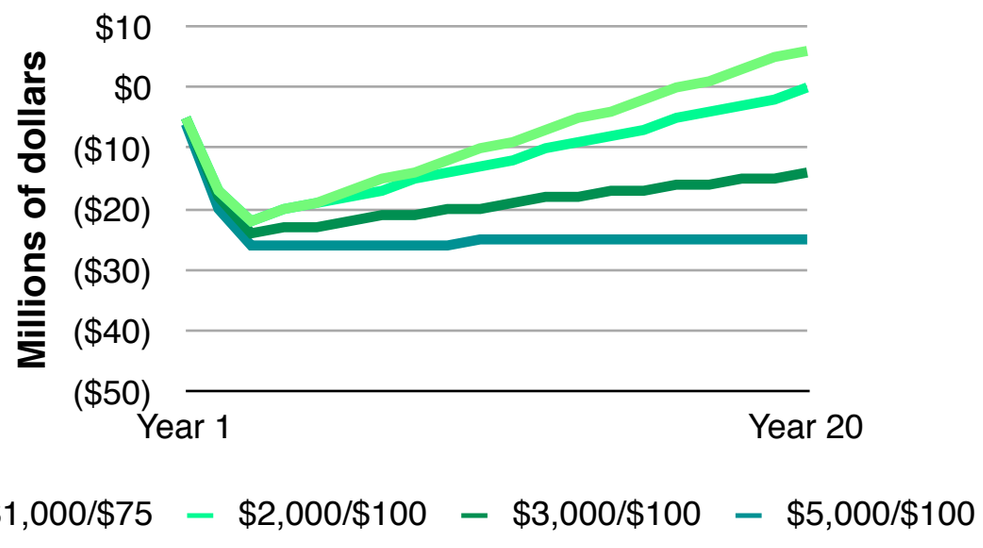


Chart 5.10 Base Model with $10M/$1M Subsidies & 5% Annual Growth – Net Present Value



Adding subsidies from dark fiber system operations gets it closer

With continual sub growth, NPV goes positive at extremes

Chart 5.11 Base Model with $12M/$2M Subsidies – Net Present Value

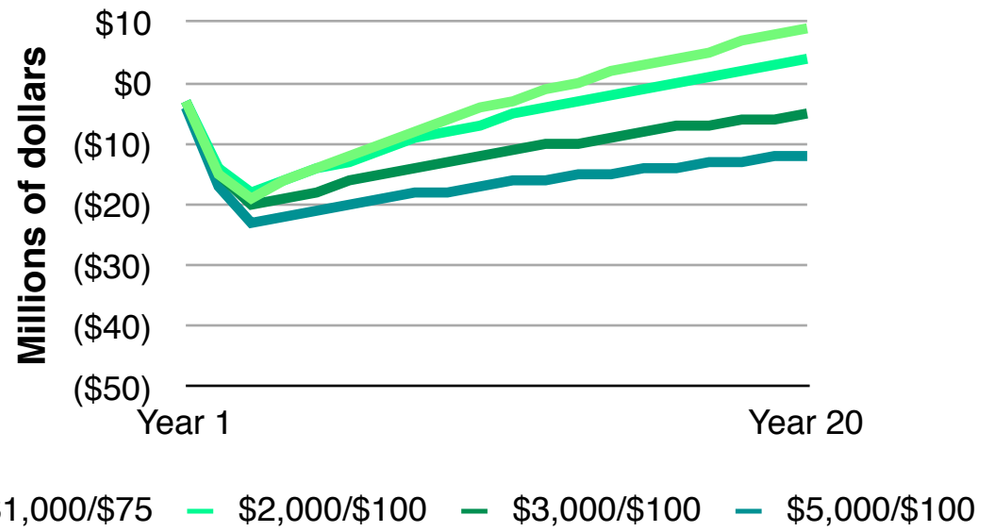
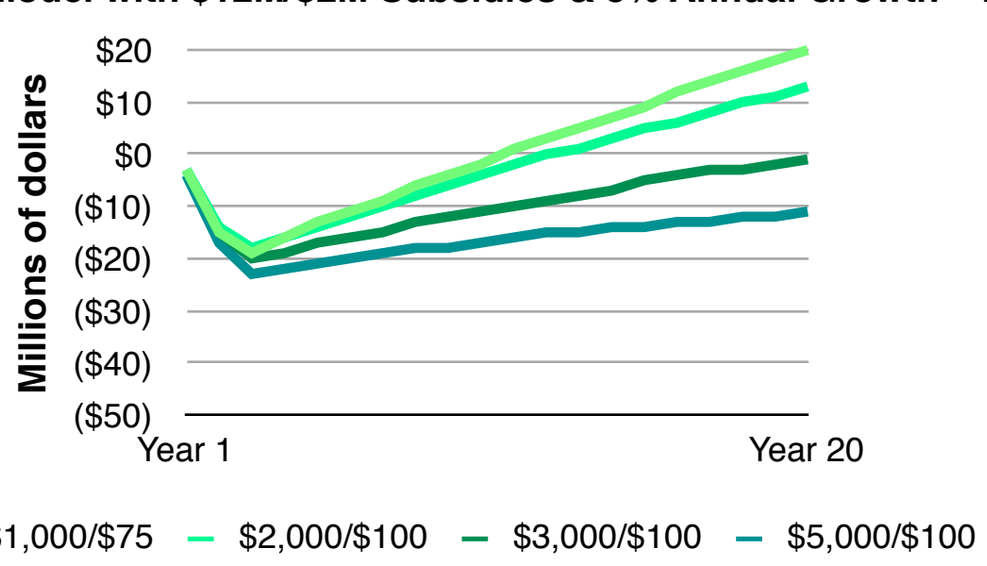


Chart 5.12 Base Model with $12M/$2M Subsidies & 5% Annual Growth – Net Present Value



Larger subsidy improves results

Even so, base case NPV never goes positive

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