South Bay Cities, California: Fiber Optic Master Plan

Executive Summary

The Digital Imperative: Business requires network services and skilled workers

The South Bay has the opportunity to create a new and inclusive economy; supporting quality of life through workforce and economic development. By doing so, the South Bay mitigates the risk of what some are calling the "new urban crisis."[1] Generally, this is seen as a gap between the few who are doing very well and the many who are struggling. The number of wealthy households is increasing while the incomes of middle-class households and college-educated have shrunk. There are plenty of low-wage, low-skill jobs and employers are struggling to find workers with the skills for high-paying jobs. Housing costs have increased with congestion, but the quality of housing stock has not. A few organizations excel with technology, but many struggle with it. These gaps are the results of economic, social, and technological megatrends, which are swamping those communities that are unprepared to get on top of the waves of change.

Bandwidth and connectivity are critical factors to success in today's digital economy. Business must have them to move, share, and use data.

Manufacturing *has led the way with automation, computer-based design, and supply chain integration, with business processes tightly integrated with electronic processes.*

Education *and healthcare have digitized assessments, documents, and records for students and patients.*

Governments, non-profits, and service industries *are automating and transforming their processes via the internet.*

High-performing organizations simply cannot work without abundant bandwidth. Communities that don't have it won't keep businesses within the community.

The way markets and organizations operate is changing, and needs for connectivity and skills are changing, too. Too many South Bay organizations have limited connectivity, expertise, and solutions. Consequently, they are under-investing in technology, which puts them at a competitive disadvantage. Organizations are feeling pressure from customers and competitors to do more with technology, and they generally expect their technology needs will increase.

While limited business solutions and network services are issues, workforce capabilities—from executives' knowledge to IT experts' capacity to workers' basic digital skills—represent the critical barrier to additional investment.

[1] *Scholar Richard Florida, who foresaw the return of young "creatives" to urban cores, has a new book entitled "The New Urban Crisis" that details the problem.*

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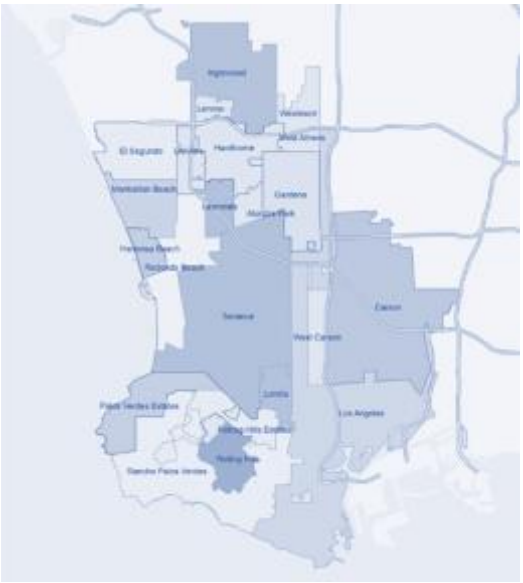
The Digital Inclusion: Creating Opportunity and Economic Development in the South Bay

The South Bay is geographically and economically positioned to significantly contribute to the global economy. This report examines how and why the fifteen South Bay cities (see Figure below) can create a region of digital inclusion that stimulates workforce and economic development – creating a smart region built on a fiber-optic network infrastructure.



South Bay Cities

- Carson
- El Segundo
- Gardena
- Hermosa Beach
- Hawthorne
- Inglewood
- Lawndale
- Lomita
- Manhattan Beach
- Palos Verdes Estates
- Rancho Palos Verdes
- Redondo Beach
- Rolling Hills
- Rolling Hills Estates
- Torrance

Needs and opportunities for network services—among the cities, and with local businesses and institutions—are considered in detail. Magellan Advisors conducted interviews and surveys of a range of local business, civic, and technology leaders to provide the information within this report. The availability of infrastructure and services were examined, in addition to the skills, knowledge, and abilities necessary to build and maintain regionally-driven smart city systems. These variables are consistent with technology-intensive company capabilities.

Magellan Advisors found a clear opportunity and strong reasons to interconnect the South Bay cities. The cities can get more internet bandwidth for a lower per megabit rate, and the cities can share systems and data to operate more cost-effectively. The network provides means for the cities to interconnect their sites, provide public access, and even give local institutions and non-profits more bandwidth for less.

A Vision of South Bay's Digital Development

The vision for a Smart South Bay starts with the cities getting more bandwidth for less—the more efficient use of resources to more effectively meet residents' needs. From there, the vision is for improved regional public-sector communications. Emergency services, public works, and transportation will be faster and more effective, making residents safer, healthier, and less stressed. Residents use the network to increase their skills and do new types of work, earning more online. The full vision is of high-tech companies starting up, relocating, and growing across the South Bay, fueled by the local talent pool and by ultra-fast broadband. In the process,

businesses repurpose old industrial sites and revitalize the cities' neighborhoods, and the cities develop new technology-enabled revenue streams.

The South Bay's Digital Infrastructure Costs

Current Network Costs by City

The South Bay has extensive network infrastructure but it is inconsistent and fragmented. Several South Bay cities own fiber-optic, wireless, and other infrastructure, but some have only basic connectivity. Much of the cities' infrastructure is not interconnected to other network infrastructure, including other cities. There are multiple facility-based providers with infrastructure in the South Bay area but it is not consistently available or readily accessible.

The costs to get to and connect through a fiber network can be prohibitively high. Generally, network infrastructure and services are more available on the west side of the South Bay, and to the north. Eastern and southern South Bay cities have less infrastructure and fewer options. El Segundo, Manhattan Beach, and Redondo Beach have made significant infrastructure investments, and Inglewood is actively studying needs and opportunities.

	Contracted Mbps		Actual Mbps		Monthly cost	Monthly cost per Mbps	
City	Down	Up	Down	Up		Down	Up
Carson	100	100	100	100	$1,500	$15.00	$15.00
El Segundo	100	10	75	7	$531	$7.08	$75.86
Gardena	200	200	200	200	$2,600	$13.00	$13.00
Hawthorne	50	50	42	19	$3,700[2]	$88.09	$194.70
Manhattan Beach	100	100	93	42	$7,800[3]	$83.87	$185.71
Inglewood	1000	1000	850	750	$6,000	$7.06	$8.00
Rancho Palos Verdes	150	150	149	152	$4,000	$26.85	$26.32
Redondo Beach	100	100	40	38	$6,300	$157.50	$165.79
Rolling Hills Estates	50	50	49	46	NA	NA	NA
Torrance	308	317	54	54	$3,933	$72.39	$72.84
				Averages	$3,629	$43	$63
				Total	$32,664		

[2] The City of Hawthorne is currently contracted with two service providers for 50 Mbps circuits at rates of $2,100 and $1,500.

[3] The costs for Manhattan Beach at the time of the survey in 2016 were for a 50Mb circuit. In June 2017, the City is transitioning to three 1Gb circuits at a rate of $1300 each for a total of $3900 per month. This results in a 50% cost reduction while increase transport capacity by 5900%. Reducing the monthly cost per Mbps to $2.30.

Currently, the cities are paying about $43 per Mbps download and $63 per Mbps upload per month.

Future Fiber Network Costs Models

Future gigabit services cost estimates range from $1.25 Mbps to $0.68 Mbps per month for bandwidth from 1 Gbps to 10 Gbps and over one to three year contracts.

Cost estimates to build out a fiber network with gigabit capacity that will connect South Bay cities total between $2.4 million and approximately $3 million, and include non-recurring and monthly recurring costs for a 5-year period. This initial cost estimate is based on current industry pricing and assumes that one priority location within each city would be connected and that IP/transit service capacities would range from 1 Gbps to 10 Gbps. The table below provides an estimate for monthly recurring costs for 12 to 36 month terms.

Estimated Provider IP/Transit						
1x10GE Port	12 Month Term		24 Month Term		36 Month Term	
	Price/Mb	Total MRC	Price/Mb	Total MRC	Price/Mb	Total MRC
1Gb Commit	$1.25	$1,250.00	$1.13	$1,130.00	$1.05	$1,050.00
2Gb Commit	$1.20	$2,400.00	$1.08	$2,160.00	$1.00	$2,000.00
3Gb Commit	$1.15	$3,450.00	$1.04	$3,120.00	$0.95	$2,850.00
4Gb Commit	$1.10	$4,400.00	$0.99	$3,960.00	$0.90	$3,600.00
5Gb Commit	$1.05	$5,250.00	$0.95	$4,750.00	$0.85	$4,250.00
10Gb Commit	$0.85	$8,500.00	$0.79	$7,900.00	$0.68	$6,800.00

Initial cost estimates per city are outlined in the table below and are based on priority locations provided by South Bay cities.

City Locations	Estimates for 1 Gbps SMART-Net				Estimates for 10 Gbps SMART-Net			
	Option 1		Option 2		Option 1		Option 2	
	MRC	NRC	MRC	NRC	MRC	NRC	MRC	NRC
2 Portuguese Bend Rd., Rolling Hills	$929	$288,834	$8,335	$0	$1,394	$288,834	$8,968	$0
340 Palos Verdes Dr. W, Palos Verdes Estates	$929	$250,429	$7,227	$0	$1,394	$250,429	$7,776	$0
24300 Narbonne Ave., Lomita	$929	$142,196	$4,103	$0	$1,394	$142,196	$4,415	$0
701 E Carson St., Carson	$929	$113,947	$3,288	$0	$1,394	$113,947	$3,538	$0
30940 Hawthorne Blvd., Rancho Palos Verdes	$929	$100,298	$2,894	$0	$1,394	$100,298	$3,114	$0
1315 Valley Dr., Hermosa Beach	$929	$99,029	$2,858	$0	$1,394	$99,029	$3,075	$0
12501 Hawthorne Blvd., Hawthorne	$929	$88,237	$2,546	$0	$1,394	$88,237	$2,740	$0
1 W Manchester Blvd., Inglewood	$929	$80,461	$2,322	$0	$1,394	$80,461	$2,498	$0
1400 Highland Ave., Manhattan Beach	$929	$66,019	$1,905	$0	$1,394	$66,019	$2,050	$0
415 Diamond St., Redondo Beach	$929	$65,861	$1,900	$0	$1,394	$65,861	$2,045	$0
14717 Burin Ave., Lawndale	$929	$65,226	$1,882	$0	$1,394	$65,226	$2,025	$0
3031 Torrance Blvd., Torrance	$929	$59,830	$1,726	$0	$1,394	$59,830	$1,858	$0
1700 W 162nd St., Gardena	$929	$57,608	$1,662	$0	$1,394	$57,608	$1,789	$0
350 Main St., El Segundo	$929	$56,973	$1,644	$0	$1,394	$56,973	$1,769	$0
4045 Palos Verdes Dr. N, Rolling Hills Estates	$929	$52,053	$1,502	$0	$1,394	$52,053	$1,616	$0
Totals	**$13,935**	**$1,587,001**	**$45,794**	**$0**	**$20,910**	**$1,587,001**	**$49,276**	**$0**
5-Year Total	**$2,423,101**		**$2,747,640**		**$2,841,601**		**$2,956,560**	

Strategy for Creating a Smart Region: How the South Bay Can Get Smart

The South Bay cities can improve operations, spur economic development, and create new job opportunities with a middle-mile regional advanced technology network. The overall goal is to enable new, sustainable, technology-based economic development, to grow and keep high-performing companies with high-paying jobs. The South Bay cities can almost immediately get much more bandwidth and internet connectivity at a much lower cost per megabit. So, the network makes short-term sense. The network is a platform for a range of smart community applications to support quality of life and government performance.

The concept is to incrementally build-out fiber-optic connectivity—starting with the cities. By beginning with connecting the cities to each other and to the internet via fiber-optic cables, the region prioritizes its initial municipal needs with a longer-term vision of promoting economic development and expanded smart city services. Initially, private providers build and run the network. The cities jointly purchase data transport and internet bandwidth. As cities develop their own infrastructures, starting with conduit and poles, they can spur private technology investment. Benefits increase as municipal offices and community institutions are interconnected. The infrastructure evolves into a publicly owned network to meet public purposes parallel with private services for businesses and residents. The steps are:

1. *Establish an agreement or understanding among the cities to jointly purchase network services.*
2. *Identify additional network users and funding mechanisms.*
3. *Adopt broadband-friendly policies across the South Bay.*
4. *Request competitive bids to build-out and run the network.*
5. *Build-out a provider delivered network.*

6. *Collaborate with private sector to launch smart community applications, identify municipal revenue opportunities.*
7. *Integrate municipal infrastructure into the network and expand network reach.*

The network will give the cities much more internet bandwidth for much lower per megabit rate: 60 to 70 times more bandwidth at about half the average cost per city! The network also allows the cities to better share data and resources for essential services, such as public safety. Initially, the network is designed to connect one site in each city via a private provider, to be expandable to serve a range of community institutions, including all local government facilities, and to incorporate publicly owned infrastructure. The public infrastructure investment can catalyze and complement private investment to serve businesses and residents.

Much, if not all, of the initial cost of network can be covered by savings on the cities' current telecommunications costs. Bringing other network users in will further spread the costs, making it even more economical for each city. If funding can be found to deploy public facilities in key areas, network reach and performance will be even greater and recurring costs will be even lower.

Now *is the time for SMART-Net*

Now is a prime time to begin realizing the vision of a smart South Bay. Much of the SMART-Net can be provided by the region's substantial but fragmented fiber infrastructure. Small, incremental investments by the cities, made in a coordinated but independent manner, are an economical way to enhance and extend the existing infrastructure. This opportunity may not be available in the future as the market changes. At the same time, the cities are interdependent, sharing many demographic, economic, and geographic resources. When a large employer has a downturn, everyone is impacted. The South Bay cities have an opportunity to leap ahead together, but are also at risk of being left behind.

Digital technology has transformed the economy. Many market leaders of yesterday are gone because they could not adapt. The highest-earning and fastest-growing companies focus on intangible assets—computer code, digital data, and electronic systems. They can virtually locate anywhere with high-capacity networks. Highly adaptable and capable workers are the key factor.

Economic attraction and retention comes down to a simple reality . . .

You must have digitally skilled people and extensive network infrastructure. Technically savvy people and companies simply will not go or stay anywhere without lots of bandwidth and easy connectivity. Broadband has become a utility that is necessary for work, play, and everyday living.