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THE DIGITAL DIVIDE, MARKET FAILURE, AND HIGH-SPEED WIRELESS SUPPLY: CALIFORNIA'S "MIDDLE MILE BROADBAND INITIATIVE" [MMBI][1]

Photo: Instagram

What a gripping image[2] – so hard to see, and then, equally hard to unsee:

Two young girls, their faces mercifully obscured by Instagram emoji-anonymity, are seen sitting on a downtown sidewalk. One wears a hooded sweatshirt for warmth; the other is in short sleeves. They've chosen a spot up against a parking-lot curb and hedge, between two subground-access-hole covers, and they are immersed in their schoolwork. Each is hunched over a laptop, with notepaper and pencil lying adjacent on the sidewalk.

Attending to the girls are two masked, headset-wearing, uniformed fast-food employees (turns out this was outside a Taco Bell). Presumably strangers to the girls, one of the staff-members is squatting to address them at ground level, with the other looking on, concerned. A supply truck unloads at the curb in the background.

One's imagination tries to fill in the script. Maybe the employees are inviting the kids inside. Maybe they're telling them that loitering is prohibited.

Businesses like Taco Bell offer open-network internet service because doing so draws paying customers. It is just one of many modern conveniences provided by that industry and others. But the wireless signal leaks out to the exterior, so any enterprising user can have at it. Taco Bell or no, school is in session. Even if this is a parking lot.

[1] The author wishes to acknowledge the valuable research assistance of Miray Salman and informative guidance provided by interviews with visionary California policy leaders: Scott Adams [CDT], Stuart Drown [Gov Ops], Jennifer Lugo [Caltrans], and James Hacker [Office of Governor Gavin Newsom].

[2] Descriptions of the photo and its aftermath are drawn from Yancey-Bragg (2020). For additional background on broadband inequities for K-12 students, see Botts & Cano (2021).

It's the late summer of 2020, at the height of the pandemic quarantines. School is miraculously back up and running for the Salinas [CA] City Elementary School District and its 8,500 students, albeit remotely. Once a specialization, distance-learning became K-12's modus operandi.

The image of these students, perched where they could get access to the restaurant's broadband signal, went viral. Some viewers online commiserated with the girls' desperation; others praised their resourcefulness and resilience. The attention and outpouring of empathy was real. After learning the girls' family were also facing eviction, an online benefactor started a GoFundMe and raised over $130,000 to provide a helping hand.

While the girls' faces were hidden online, the District quickly identified them once the photograph circled the globe. Almost immediately, perhaps to avert all the unwanted attention and promptly resolve the issue, the District provided the family a free 5G wireless hotspot financed via its own funds. The District hoped to receive additional hotspots from a state-funded program, so more wireless-deprived students and their families could be provided the assistance. To their credit, schools in the District had already given out more than eight thousand free laptops and 1,500 hotspots.

But the hotspots were band-aids, ultimately. Distance learning via live video-feeds requires stronger signal than that. And the quality of the hotspot-service depended on where students lived. Particularly in less densely populated rural areas - but across denser urban locations as well - some households lacked access to the kind of wireless service they needed. And suddenly their kids could not meaningfully participate in school without it. Nor would such families be able to access the remote health-care visits they might require during the shutdowns.

In Salinas and across California folks responded as one would expect. Politicians made hay, with one state senate leader pointing out the irony of such internet inequity persisting in the same state that plays host to innovators in Silicon Valley. The District board-president acknowledged that delays in getting internet access to all students had become an urgent imperative. And as a kind of accidental bystander, even Taco Bell corporate chimed in, with a spokesperson telling *USA Today* that the photo was "a tough reminder of basic inequalities facing our communities … We and our franchisees have always been passionate about supporting youth education, and the owner of this restaurant is looking into additional ways to support these students and the broader community."

Taco Bell's statement understandably omitted the obvious: fast-food parking lots are for cars, not for adults pirating internet service or, sadly, for schoolkids on the ground with laptops.

Well before pandemic, and since the dawn of the Internet, these digital divides have been impossible to ignore. They are well known to residents, communities, and policymakers alike. Many would-be customers simply lack the resources, and knowhow, to ensure uptake of new service. Many places become "internet deserts" as a result, some even lacking lower-speed 5G coverage. And from the broadband industry's standpoint, less populated places and less intensive online use upend the business case for substantial new fixed-cost network investments expanding the coverage-map into places needing speedy signal. Overall some 15% of the state's residences – at least two million households – lack high-speed network access.[3]

For many underserved households, understandably, high-speed internet service has long been an out-of-reach luxury. Lack of access and inclination have been mutually reinforcing. Households affected by wireless scarcity do what they can to cope. The girls outside the Taco Bell make that reality manifest. But due to Covid-19 and its aftermath, the internet is now more of a vital necessity, a virtual lifeline to the outside world during the quarantines, and a key ingredient to flourishing in modern-day society and culture. Access to highest-speed

[3] See, e.g., an excellent 2023 report on MMBI planning efforts published by the Public Policy Institute of California (Hayes, Gao et al., 2023), which serves as a valuable supplemental reading for this case, particularly with respect to local and regional efforts which preceded, and became resources for, MMBI.

networks is of the utmost importance to marginalized families, in a pandemic or otherwise: their kids' future and health literally have come to depend on broadband wireless.

Monopoly (Naturally)

Observers might blame regional internet service providers (ISPs), larger profit-oriented telecom companies and an ineffectual regulatory system led by the California Public Utilities Commission (CPUC) for disparities in broadband wireless. But one must acknowledge a number of intersecting causes. The predominance of English-language material online, based on a kind of global consensus as to the lingua franca of the web driven by geopolitical power imbalances, have tended to alienate non-English speakers and reduce their inclination to participate in these networks. For many communities, easily accessible 5G and smartphone devices are quite internet enough. Race/class inequities in professional training, placement, and career advancement likewise have kept marginalized folks from developing the "online state of mind" and associated digital skillsets. Given the welter of interactive forces influencing both demand and supply, zeroing in on one focal policy-inspiring problem-definition to address the predicament is challenging.

To give policy-design some traction, experts have conceptually divided broadband delivery into what one might call **"middle-mile"** and **"last-mile"** segments. These terms have traditionally been used in transportation systems to distinguish long-haul (e.g., air, rail, seagoing vessels) versus localized delivery (trucks, vans). For broadband, the analogy can be applied conceptually, by thinking about the roadway networks themselves and how they developed to connect a dispersed collection of nodes. Networks of those fast high-capacity freeways bring people, goods and services together over long distances (middle-mile). In turn, local streets bring residents and economic resources to and from main arteries and highways (Liu, 2023).

The last-mile in broadband delivery and consumption obviously involve complexities all their own, including the sociodynamic household-level idiosyncrasies such digital-divide policy has tried to address. Policy prescriptions like California's 2023 "Digital Equity Plan"[4] distinguish "last mile" features (bringing broadband wiring and infrastructure to the front door of every home and office) from ones involving "adoption" (ensuring access, affordability, consumer uptake, devices like computers and tablets, and necessary in-home and -office internal wiring). But in terms of *geographic* disparities – especially those driven by lesser populated rural areas – reducing middle-mile scarcity is a logistic precondition to making those last-mile policies effective. Nor will the policy effort succeed in the final analysis if the middle- and last-mile issues are addressed without ensuring that service is affordable to lower-income families. All this said, without high-speed service reaching underpopulated areas at all, little can be done to address last-mile affordability issues.[5] And barring vast expansion and improvement of the kind of satellite-delivered high-speed broadband by space-technology companies like SpaceX and Amazon's Project Kuiper, terrestrial optic-fiber networks will remain the middle-mile's route to completion.

Perhaps California's challenge of reaching underserved rural areas and small disparate towns is no less vast. Only five percent of California's land-mass of over 150,000 square miles is urbanized. Nodes of broadband supply in the hinterlands involve spotty coverage delivered by small companies. The firms with the technical capacity and financial wherewithal to take on such a statewide middle-mile construction project - circuiting the entire state with proximate fiber-optic points of access – unfortunately lack the motivation.

The problem isn't just a deficit in corporate motivation and C-suite altruism. Rather, the issue is one of classic market failure, namely, **natural monopoly**. Such networks show historical kinship with railways and simple electricity. Redundant hardware-loops waste resources, when one loop will be adequate given expected levels of

[4] CDT, 2023.

[5] The interactions among these objectives are discussed in US Dept. of Ed. (2022).

service-demand. High construction costs generate their own barriers to entry, and increasing returns to scale are crucial. As to basic electric power, far-flung expanses across the globe still lack reliable service, and natural-monopoly theory makes that status quo quite predictable. Absent sufficient public subsidy, regulatory incentives, or public delivery via outright state-based ownership and operation, wiring rural areas never pencils out among for-profit firms. And even where government builds out the backbone, existing remote-service providers may feel threatened and oppose that investment politically. They have enjoyed first-mover advantages in those markets, and a fully operational middle-mile system may well threaten their bottom line. At the very least, with increased demand for last-mile service and installations, those enjoying market power regionally will face new competition. After all, creating that competition may be good for consumers and relieve geographic and other forms of disparity.

These call-and-response patterns under natural monopoly conditions should be familiar to policy makers via analogous scenerios. The history of power access in the United States turns on the massive national investment program initiated by FDR's depression-era Rural Electricity Act of 1936 [REA]. With the companion purposes of boosting public employment and electrifying more of the nation's agricultural operations, thousands of miles of rural America were newly wired. A network of quasi-private cooperative wholesaler firms was established, and public investment in grid-technology grew rapidly. While its great achievements were complete by mid-century, the federal government's Rural Utilities Service (within US Department of Agriculture [USDA]) continues to operate, supporting many of the original public-private co-ops still serving rural communities today. The REA success story has lessons to teach a world with plentiful electricity but disparities in broadband internet access.

California's Middle-Mile Broadband Initiative [MMBI] & Gov. Gavin Newsom's Resilient Vision

You campaign in poetry. You govern in prose.
~Gov. Mario Cuomo

More can be said: You legislate in dreams. You implement in friction, and reality.
~Scott Adams, Deputy Director of Broadband and Digital Literacy,
California Department of Technology

The structural nature of natural monopoly – and the prototype of rural electrification – usefully characterize the challenges facing California's "**Middle Mile Broadband Initiative**" [MMBI]. MMBI is being advanced by the administration of Governor Gavin Newsom, who knows a thing or two about broadband installation sought from monopolist franchisees.

As a forward-thinking mayor of San Francisco during the maturation of the modern internet, Newsom proposed in 2004 a revolutionary municipal wireless network[6] providing free internet access to every residential and business location throughout the city. At the time still a relatively nascent technology, wi-fi provided mobility compared to wired ethernet and seriously outperformed dial-up service. San Francisco's moonshot project offered to transform for-profit broadband delivery into a kind of universal public utility, conceptually not unlike the city's "Muni" transit system of buses and light-rail vehicles making stops proximate to every city address. But rather than charging anything akin to fares at the turnstile, the muni-wireless service would be airborne virtually everywhere, and free-of-charge to anyone with a computer and a wireless-band antenna. Access points would be attached to exterior light stanchions and buildings, across all neighborhoods. To bring this vision to reality, the

[6] This summary of San Franisco's failed municipal-wireless proposal draws upon the rich narrative offered by Wikipedia (n.a., 2023). See also Charny, 2007.

city tentatively accepted a 2006 bid from online-search powerhouse Google partnering with Earthlink (a well-known competitor to brand-name internet service providers like AOL).

However, the Google-Earthlink plan foundered, when the latter company's financial struggles caused it to balk. During contract negotiations Earthlink began refusing to assume the financial risk of construction. In response, neither Google nor the city were willing to invest substantial enough dollars to bridge the gap. While Earthlink attempted to salvage the deal by offering a higher-bandwidth premium service to paying customers, the city's budget analyst took a dim view on the financial sustainability of universal municipal service. The draft contract did not make it out of committee at the city's board of supervisors, and then-Mayor Newsom was forced to scrap the plan altogether.

Newsom was convinced at the time that wireless broadband could become an engine of economic prosperity and upward mobility for all San Franciscans. He blamed the failure of his municipal-wireless initiative on politics[7] but, given his championing of statewide broadband investments as governor, his belief in the social potential of expanded online access seems never to have wavered. Once elected as California's lieutenant-governor after his years as Mayor, Newsom even coauthored a 2013 book, *Citizenville*, arguing that online discourse promised to transform democracy and help reinvent government itself.[8] Extending the "electronic franchise" has been a priority for Newsom, and now as governor he had the chance to meet the challenge statewide.

After Newsom left office in San Francisco, the tone for such municipal leadership had been set. As chair of the US Conference of Mayors [UCSM] committee on technology, Newsom's successor Mayor Ed Lee led the adoption of a 2014 UCSM resolution asking the US Federal Communication Commission (FCC) to reclassify broadband as a utility, consistent with Obama Administration initiatives attempting to further the enforcement of "net neutrality" standards and other protections.[9] The San Francisco push for recognizing broadband as a public utility ultimately ran aground, however, when the FCC scrapped net-neutrality standards under President Trump.[10]

By the time Newsom took office as California governor in 2019, bridging the digital divide had long been an abiding policy focus, for several years under the programmatic banner of "Broadband For All."[11] More than a decade prior, in 2008, CPUC launched the California Advanced Series Fund (CASF), which aimed to provide financial incentives up to $100 million to for-profit ISPs. Then in 2010, CA Senate Bill 1462 formally established the twelve-member California Broadband Council (CBC), charging the new body with the promotion of deploying network access to underserved households and geographic areas, as defined by CPUC. As the telecom line regulator, CPUC also helped designate priorities given its read on low-or-zero signal gaps and zones of middle- and last-mile development opportunities. CBC is staffed by the California Department of Technology (CDT) and its Office of Broadband and Digital Literacy. CBC's appointed membership represents the breadth of community, regulatory and philanthropic interests across California that have supported expanded broadband access.[12]

Unfortunately, CASF funds fell well short of the public investment needed to expand the network sufficiently. Companies like AT&T and Comcast too often offered slower Digital Subscriber Line (DSL) or coaxial service, over existing twisted-pair phone connections and cable TV lines, respectively, opting to build new fiber-optic

[7] Then-Lieutenant Governor Newsom lamented the role of city politics, during a later interview (Gannes, 2013).
[8] See Newsom and Dickey, 2013.
[9] See Adams (2019a).
[10] See AP (2023).
[11] For information about Broadband For All, see its website (https://broadbandforall.cdt.ca.gov).
[12] The Council's members represent CDT, both houses of the state legislature, the state superintendent of public instruction, CPUC, the Governor's Office of Emergency Services, the Department of General Services, Caltrans, the state library, the Department of Food & Agriculture, the Department of Tribal Affairs and the California Emerging Technology Fund.

infrastructure only in selected demonstration areas.[13] Under the prevailing "25 Mbps down, 3 Mbps up" standard,[14] DSL, coaxial-cable wireline and comparable service levels long sufficed for most customer applications. But non-fiber formats require repeaters and other network additions boosting signal and avoiding dropouts. DSL and its ilk ultimately suffered performance shortfalls and network congestion, especially once a) streaming video for entertainment, b) high-bandwidth interactive online video-gaming, and c) video teleconferencing and learning over platforms like Zoom and Teams became everyday usage for more and more customers. Needless to say, the Covid-19 pandemic and quarantines led to an explosion in broadband demand during the early 2020s.

Fearing excessive public presence in broadband undermining their market dominance, large wireline operators and service providers lobbied successfully for legislation limiting the reach of CASF and lowering the regulatory bitrate-standards considered sufficient to serve needy households and regions adequately.[15] While some isolated gains were realized in the interim, the state's larger-scale vision for expanding high-speed middle-mile lines foundered until Governor Newsom took office.

MMBI aimed to take publicly-sourced construction of California's fiber backbone to unprecedented levels. Rather than pause in the face of pandemic like so much else, the Newsom administration harnessed that political moment to give digital-divide policy new life. In August of his first full year as governor, Newsom signed Executive Order N-73-20,[16] both aiming to add urgency and expand agency-level responsibility to a greater share of the government. Newsom's executive order made the following findings:

- Over 2,000,000 Californians lack access to broadband reaching the threshold of 100 Mbps.
- Over twenty-three percent of housing units lack any broadband subscription whatsoever (as of 2018).
- Over a third of the state's elderly use the internet in only limited ways if at all.
- Covid-19 accelerated the vital need for broader access to online education and telehealth.

The executive order set 100 Mbps as the statewide minimum for adequate network speeds, thereby demoting slower technologies as well as insuring that middle- and last-mile circuitry would require fiber-optic cable and associated network infrastructure.

Going even further, Governor Newsom's 2020 executive order set out an innovative vision for public intervention in broadband-supply markets given the reality of natural-monopoly features:

- CPUC was directed to collaborate with the state transportation agency (CalSTA, including the California Department of Transportation, or Caltrans) to map areas without broadband access at the prescribed speeds. CPUC/CalSTA were also directed to identify state-owned infrastructure, land resources for MMBI installations (e.g., rights of way), as well as determining the construction cost for those installations.
- Caltrans/CPUC/CDT and the Department of General Services (DGS) were tasked with placing conduit and fiber in transportation-based corridors and to leverage existing regulatory authority and induce private firms to participate in project contracts.
- Other agencies coordinating emergency services, high-tech agriculture, K-12 schooling, affordable housing investment and aging services were asked to promote, utilize, and expand broadband infrastructure and demand-side equipment and knowhow within their service constituencies.

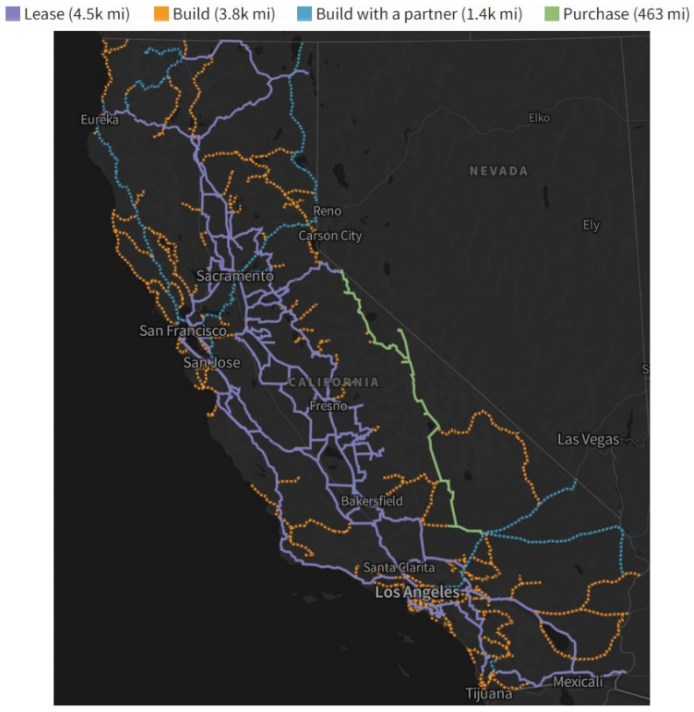
Following suit, in July 2021 the California Legislature enacted Senate Bill 156, enunciating a $6 billion federal-state spending program on broadband fiber infrastructure and digital equity, the largest such state-level public

[13] See Zelezny (2023), the source for this section's coverage of MMBI's recent legal history.
[14] "Mbps" means megabit per second. See Brodkin (2023).
[15] See Falcon (2020).
[16] https://www.gov.ca.gov/wp-content/uploads/2020/08/8.14.20-EO-N-73-20.pdf.

investment in history. As a spending program, SB 156 leveraged funds provided to the state in the federal American Rescue Plan Act (ARPA). The new legislation recognized the twin purposes and the embedded conundrum; without physical infrastructure and electronic capacity being extended to where they are needed most, investments in digital literacy and social access would make the end-goal impossible. (And vice versa.) In the big picture, the federal-state relationship presented a kind of mutual leveraging. US President Joe Biden finally signed, later in 2021, the long-planned but politically obstructed Infrastructure Investment and Jobs Act (IIJA), devoting $65 billion towards the development of broadband capacity at higher-speeds and lower prices. By 2023 California had netted approximately $1.86 billion under IIJA's "Broadband Equity, Access, and Deployment" (BEAD) allocation overseen by the National Telecommunications and Information Administration (NTIA). These funds are designated toward last-mile capacity and programming closely tracing MMBI's overall geographic plans.

It is important to note that the state legislature prioritized infrastructure in raw dollar terms, by a ratio of about two to one, with about $4 billion under SB156 going to wire acquisition and construction and the remaining $2 billion (funded largely through federal BEAD dollars) reserved for grants to cities and counties, local "last-mile" ISPs, nonprofit agencies active on the digital-divide front, libraries and school districts.[17] Regional leaders and coalitions have indeed rallied to formulate plans and apply for the latter grant-source. However, as of October 2023, the amount requested in submitted applications by the prior month's deadline already exceeded available grant funds by a substantial amount. The discrepancy amounted to over $2.5 billion, presenting a commensurate allocation-priority challenge (essentially, akin to rationing a scarce and insufficient resource), in policy and political terms. One saving grace in the middle of this allocation predicament: the last-mile applications included representation from every California county, and this is a testament to project-partners' success in organizing stakeholders and thereby harnessing regional potential.

The state's initial-phase project map demonstrates the geographic extent of the challenge as well as formidable progress. MMBI originally aimed to build about 10,100 miles of new optical fiber capacity, utilizing four primary strategies: i) leasing existing high-speed capacity, through "indefeasible rights of use" (IDUs); ii) state-managed, contracted construction; iii) partner-managed construction; and iv) purchasing underutilized lines for state-directed operation. Progress is regularly reported by CDT to MMBI's advisory council, which meets quarterly. At the October 2023 meeting, CDT's Mark Monroe reported that an impressive 83% of the project's miles were subject to completed contracts across the four construction/acquisition categories.[18]



[17] Legislative information and project status maps are drawn from Reyes-Velarde (2023); that source cites and utilizes the MapBox and OpenStreetMap apps, which own the copyright to such graphics.

[18] See Monroe (2023). Agendas, recordings, meeting minutes and presentations for all MMBI Advisory Committee session are available at the MMBI website.

Innovations in Implementation:
Public Problem-Solving in Action

MMBI's four-pronged strategy for installing high-speed backbone capacity presents unprecedented complexity and implementation challenges. Across a landmass as expansive as California's, organizing the effort in any centralized way from Sacramento required a full-court press administratively, a program of promotion and partnership-building, and a great deal of problem-solving ingenuity along the way. Harnessing local coalitions would be pivotal, since rural and tribal areas already had organized to lead regional digital-divide conversations for years. Some had even managed to resolve middle- and last-mile supply problems creating new access for underserved constituencies.[19]

Time becomes quite of the essence for MMBI: SB 156 funds leveraged those provided by the federal government under ARPA, which required commitment of project dollars by December 2024 under a federally imposed timeline and completion of all work-related expenditures by December 2026.[20] With the clock ticking, progress in implementation requires finessing known bureaucratic barriers. Conquering the sheer burdens of coordination - across countless authorities and locations - lies almost beyond imagination in a place as large and complex as California. Some examples of the innovative implementation and management strategies being utilized are:

- Programmatic Permitting. Nearly every aspect of the MMBI implementation design requires multiple permitting processes to be negotiated. These include completing general environmental-impact reviews, weighing effects on species and habitats, historic preservation, and wildfire-risk management. Project leadership at CDT therefore convened strategic meetings with environmental-resource and other stakeholder agencies, to explore collaboration, build efficiencies, and avoid unnecessary duplication of effort. Long familiar in environmental circles, such "programmatic permitting" opportunities[21] aim to help MMBI meet stringent contracting and spending timelines. Following the agency-collaboration mandates couched in both Governor Newsom's 2020 executive order and SB156, CDT forged MMBI-implementation operating agreements with permitting authorities like the California Coastal Commission, the state Department of Fish & Wildlife, and the state Water Resources Control Board. Though the process of negotiating interagency agreements costs a lot up front, the time-savings can be substantial. Quite helpful in that regard is a general environmental-regulatory exemption in SB156 obviating the need for full-blown impact review under the California Environmental Quality Act (CEQA). However, that exemption only reaches MMBI-miles covering existing transportation corridors and requires that project managers meet a series of sometimes stringent preconditions.

- "Highways" of Success.[22] Existing rights-of-way owned by the state and administered by Caltrans, the state's chief transportation agency, represent an invaluable land-resource covering perhaps eighty percent of the installation-miles MMBI aims to wire. But those rights-of-way are overseen by twelve distinct Caltrans district offices, each operating within its own sphere of influence and command-control authority. Under ordinary conditions in highway management, each district manages its own project

[19] . A striking early success was "Digital 395," a project tracing the highway corridor along the eastern escarpment of the Sierra Nevada mountain range and connecting national internet nodes in Reno, Nevada and Barstow, California. Built utilizing CASF and Obama-era federal stimulus funds, Digital 395 delivered 1 Gbps speeds to hundreds of community-anchor nodes like schools, libraries, tribal lands and hospitals (see CBC, 2018; Arnold & Sallet, 2020). For addition background on local coalition-building, problem-solving, and service-delivery strategies, see Adams (2019b, 2020).

[20] Hayes, Gao et al. (2023):18.

[21] Caltrans (2022).

[22] This Caltrans narrative relies on 2023 interviews with Stuart Drown of GovOps, Jennifer Lugo of Caltrans, and Deputy Cabinet Secretary James Hacker of Governor Newsom's staff.

priorities, regional specializations, local agency relationships, and workforce. Transportation work in a state like California logically involves dispersed authority geographically; the culture of regional units is understandably dominated by engineering knowhow relating to bridge-highway construction and repair. Project mindsets generally cover relatively short distances and timeframes, as opposed to the kind of enterprise-level rapidity MMBI and its pressing federal deadlines entail.

With leadership from Governor Newsom's "GovOps" team and CDT, as well as coordination sourced through the White House Office of Federal Procurement Policy in Washington DC, the state-level planning work was repackaged into territories crossing traditional Caltrans district boundaries. Data visualizations and advocacy across CDT's networks helped Caltrans's district leadership understand the fiscal and policy stakes, and the urgency. The remapping alone helped spawn a new kind of intra-agency collaboration within Caltrans geographically. The resulting framework combined streamlined technical requirements covering a variety of conditions on the ground (e.g., nature of soils and slopes adjacent to corridor roadways) and compelled contractors to bid on no less than 500-mile segments of fiber installation.

This adaptive rethinking - essentially envisioning how a specialized agency like Caltrans can do business in novel, accelerated ways - helped MMBI attract numerous multi-mile bids. These covered the great majority of project-miles utilizing the state's pool of right-of-way land rights. The initiative provided resources to Caltrans, to expand its staffing as needed and to shoulder the new demand on its headquarters and district offices. Reforming agency roles and procedures takes substantial effort, and does not always fully succeed due to bureaucratic inertia and other factors. The rewards of doing so for MMBI and so much of its network map were irresistible and well worth the leadership effort. Were MMBI's transactional finesse packaged as an award-winning Hollywood movie of recent note, it might be called "*Build* Everything Everywhere All At Once."

- <u>Typical In Business, Usually Impossible In Government (Negotiating With Bidders under section 6611)</u>. Public contracting processes are designed to guarantee that all those interested in doing business with government enjoy equal if not identical opportunities. To insure that political insiders enjoy no special advantage, project specifications have to be finalized before contracts are put out to bid. If those specifications change along the way – in some cases, even after a contract bid has been selected and signed with the chosen vendor – other bidders enjoy some right to have the process reopened so they can adapt their bids competitively in response to the new details. Ideally such predetermination and uniformity generate a sufficient number of bids for the same work. When this works, procurement is priced as low as possible and the public interest in fiscal discipline is met.

  When project parameters are especially technical and subject to change, however, these worthy process-based protections predictably bog down policy implementation. For technology procurement specifically, California's legislature in 2003 enacted Public Contract Code section 6611, allowing for contractors to be chosen, commitments to be made, and project performance to be negotiated more flexibly as the work proceeds. Given the swiftness and adaptive nature of MMBI, such negotiating authority becomes crucial. In order to utilize 6611 and its flexibility, however, that statute requires the state and its Department of General Services to establish one of four preconditions: i) that negotiation will clarify business needs; ii) that negotiation may identify solutions which have been newly identified; iii) that complexity means bidding costs are "extremely high"; or iv) that negotiation is necessary to ensure the state is receiving the best value for its money. Given the mixed structure of MMBI's implementation plan (leases, builds,

purchase), and the patchwork nature of all the necessary local last-mile efforts, the public contracting trade-offs will often militate strongly in favor of such 6611 negotiations authority.

Such legal and regulatory innovations – helping reshape bureaucratic practice on the fly - rarely succeeds without unifying, charismatic leadership at the highest levels of government. One key source of inspiration on Governor Newsom's team driving MMBI forward is Secretary of "Gov Ops" Amy Tong.[23] Tong was appointed to that role in 2022 after serving several years as director of CDT and the state's Chief Information Officer under Governor Jerry Brown. Tong's career in state government spanned the emergence of electronic-service innovations and network technology. Her experience with systems integration and deployment covered agencies regulating health and human services, the state lottery, tax and pension authorities and the state water board. Credited by the governor and other colleagues for helping lead the way toward successful MMBI implementation, Tong became well known for coordinating emergency tech-development and upgrade projects during the COVID-19 pandemic, addressing hospital capacity, remote learning/telework, vaccination and wildfire response.

The Ongoing Politics of MMBI: Budget Reality, Regional Disparity

The financial hangover affecting many states, once the federal government's unprecedented Covid-19 fiscal stimulus wound down, came to threaten the scale and expanse of the MMBI initiative. FY23-24 presented Governor Newsom's administration with a budgetary shortfall of $32 billion, or approximately ten percent of overall spending. By the time FY24-25 numbers were published, the annual deficit for the state had grown to $37.8 billion.

Whether driven by budget issues alone or inflation's effects on construction and other costs,[24] the state's ambitious buildout for MMBI's Phase 1 appeared to shrink as 2023 wore on. As shown with respect to Los Angeles below,[25] a number of areas were remapped, reducing the project's coverage from the planned 10,100 miles of fiber-optic network down to a still ambitious 8,300 miles. The changed plan drew criticism from the Electronic Frontier Foundation and other advocates for certain communities where the network upgrades were delayed, including sectors within dense urban areas such as Los Angeles and Oakland.

State Middle Mile Map as of July 2023

State Middle Mile Map as of Aug 3, 2023

[23] See California Government Operations Agency (2023).
[24] See Mukherjee (2023).
[25] Map of changed MMBI map in Los Angeles and other details are drawn from Liu (2023).

FOR INSTRUCTORS
Learning Objectives & Case-Discussion Prompts

Analyzing different policy solutions.
Traditional policy analysis depends upon clear problem definition and development of numerous possible solutions. To what extent does MMBI reflect a search for wide-ranging solutions, as opposed to a more single-minded approach?

Challenges to implementing broadband-access policy.
Please list all the policy stakeholders and the nature of their interests. Then, as to each, describe their intentions, their level of political influence, the ways they can boost or inhibit the success of MMBI, and possible strategies for communicating with them and either persuading or compensating them.

Designing innovative solutions
What are the key evaluative criteria by which we should evaluate the success of MMBI? Can those criteria be separated from the success of last-mile programs?

Connect Market Failure To Policy Strategy: Middle- and Last-Mile Perspectives

- Utility regulators like CPUC negotiate rates and service requirements with large power companies under conditions of natural monopoly. How does MMBI's approach to broadband access differ from utility regulation?
- Ultimately, should California rely on large companies to operate its broadband networks, or would the state be better off building and operating those networks itself?
- If MMBI succeeds, how will consumers benefit from last-mile competition? If such benefits cannot be achieved, the public agency deploy and operated last-mile connections and programs itself instead?

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