

Middle Mile and Backbone Infrastructure Investments for Maine

Concept Paper - May2022

Concept

The Maine Connectivity Authority (MCA) will facilitate and/or directly invest in strategic elements of shared internet infrastructure (e.g., dark fiber, data centers, points of presence, and internet exchange points). These investments will provide long term public benefit by providing access to new internet infrastructure, increasing competition, lowering costs to ISPs and end users, and creating a more resilient internet ecosystem.

Context

This concept advances the MCA's [Strategic Summary](#) of optimizing broadband deployment:

Own or co-invest in assets to secure and maintain public benefit of shared infrastructure

1. *Own or co-invest in middle mile fiber infrastructure to support planned last mile deployments in Strategic Objective #2*
2. *Explore investment in state-owned Internet Exchange Points and similar peering infrastructure, extending NNENIX model*

Problem Statement

Maine's existing internet infrastructure is **a patchwork of individual private networks**. The middle mile infrastructure supporting these networks were generally not created to support the goal of universal broadband access throughout the state. While public and private investments over the last decade, including notably the federally-funded Three Ring Binder project, have added essential infrastructure to support this goal, **the job is not done**.

In particular, **the cost to providers of access to the public internet** is one of the major contributing factors to inadequate service for consumers in the state. Maine's geography and population density have limited the development of a robust shared internet infrastructure in all parts of the state through higher construction costs. Today, **it is still too expensive and risky** for private internet service providers to build out new middle mile in certain parts of the state, especially in rural areas, relative to the rest of the country.

In addition to higher construction costs, once operational, **Maine ISPs must purchase transport to Boston (and other metro areas) to access other networks and cached content**.

- Moving content in state from one Maine provider's network to another can require sending this data out of state, because few if any Maine ISPs peer with other Maine ISPs, raising transport costs.

- Maine lacks any meaningful concentration of the Content Distribution Networks (CDN) used by major internet content providers (e.g. video services like Netflix, social networks like Facebook/Meta, and other content providers like Apple and Google). To reach these CDNs and access this content for their subscribers, Maine ISPs must own or purchase wholesale transport, typically to Boston, but even as far as NYC or Chicago.

This is a specific problem to Maine because: **Transport between Maine and other areas, such as Boston, is very expensive, or in some cases unavailable.**

- The price of transport in Maine is higher than it is elsewhere. As one wholesale provider observed, **“it is cheaper to traverse the Rocky Mountains than to get to points in Maine.”**
- Maine has a limited number of long haul routes, and the routes that do exist follow similar paths. There are few East-West routes in Maine that can provide alternative routes to content or peering points, such as through Canada or northern New England.

The limited number of routes also **creates a resiliency problem, whereby disruptions at certain discrete locations can cause internet outages across broad swaths of the state of Maine.**

- Because so much of Maine’s internet traffic must go to Boston or further, a single disruption on these limited routes can cause significant outages for disparate providers across the entire state.
- High prices, and lack of alternative routes mean that some small ISPs forgo redundancy all together, so that a single outage can cut off all of their customers from the internet.
- Similarly, any event that disrupts the availability of resources in Boston (e.g. a significant storm or terrorist attack) could affect the availability of internet connectivity in Maine

Guiding Principles

New strategic infrastructure supported by the MCA can bridge this gap. New networks and access points will serve as digital highways and on-ramps to connect un- and under-served areas. Once built, non-discriminatory, open-access internet infrastructure can be accessed by any local internet service provider or wholesale customer, who can then directly connect to individual homes and businesses, connect to a cell tower to provide better wireless service, or provide a dedicated high connections for data-intensive businesses.

The MCA’s solution to this problem should be guided by the following principles:

1. No traffic leaves Maine that doesn’t need to.
2. Reduce or eliminate competitive bottlenecks.
3. Increase resilience by eliminating single points of failure
4. Investments should be financially sustainable and not require ongoing public subsidy.
5. Provide long term assurance for open access and non-discrimination

Process

The success of this project is foundational to the long term success of MCA's activities and the continued growth and evolution of Maine's digital infrastructure and economy. For this reason, this effort work must be integrated with the development and execution of Maine's last mile strategies, private partnerships and overall investment strategy.

The MCA seeks public input on the actions outlined below.

Proposal Overview:

The MCA's goal is to facilitate shared internet infrastructure throughout the state (e.g., middle mile fiber, data centers, points of presence, and internet exchange points). The MCA will explore various options to build and finance this state-of-the-art infrastructure, including:

1. **Facilitate new, long term dark fiber path between Portland and the Bangor area** that will be made available on open access, non-discriminatory basis.

This new path will increase competition along this route which should lower costs of transport with Maine, and increase the marketability and commercial viability of Maine's data centers. This open middle-mile infrastructure will be available to both private and community driven/owned last-mile networks, and connect community POPs and a carrier-neutral data center to Portland's internet infrastructure.

2. **Facilitate additional long-haul fiber routes to connect with neighboring states or provinces** that can be used to supplement any state-owned infrastructure and utilize Maine's strategic location next to major data center markets, subsea cable landing spots, and metropolitan regions.

New paths will increase Maine's internet resilience by creating new redundant paths out of Maine. This will also increase the marketability and commercial viability of any in-state data centers, attract new wholesale providers and/or CDNs, and lower wholesale costs through competition. Such open middle-mile infrastructure would be available to both private and community driven/owned last-mile networks.

3. **Build and own new carrier neutral data center(s)** in the Bangor/Orono area to be available on a non-discriminatory open access basis. This will:
 - Provide endpoint for interconnection/peering
 - Potential location for CDNs and hub for community PoPs
 - Endpoint for any new dark fiber connections

This investment assumes the continued development of a robust competitive marketplace for POPs in the Greater Portland market that would obviate the need for MCA investment in that area. There currently is no similar carrier-neutral facility in the Bangor/Orono area that can serve as a suitable host for CDNs or point of interconnection for last mile ISPs.

4. **Build and own new, long term dark fiber paths that extend to serve un- and underserved areas** that will be made available on open access, non-discriminatory basis. The MCA will:
- Explore ways to utilize existing rights of way across the state (e.g., Maine Department of Transportation, utilities, rail lines, etc.) to accelerate deployment, lower build costs, and provide high-speed coverage throughout the state.
 - Connect new data center to network of Community POPs in un- and underserved areas

Providing middle mile dark fiber access near un- and underserved areas should lower costs of construction and transport. This open middle-mile infrastructure will be available to both private and community driven/owned last-mile network

5. **Create at least 10 new Community POPs/Rural Exchange Points.**

- Shelters co-located at Community Hubs at schools and libraries for internet education and digital literacy in un- and underserved areas of Maine
- Space available on non-discriminatory, open-access basis
- Additional locations for peering and interconnection of last mile networks and wholesale customers
- Development efforts will leverage dedicated funding for anchor institution upgrades and improvements in the Capital Projects Fund

Community Points of Presence (CPoPs) will allow for the interconnection of fiber assets and network electronics on a non-discriminatory basis so network operators, enterprises, and content providers can come together to exchange Internet traffic between each other's networks without having to go outside of the state.

When coupled with dark fiber connections to new data center(s), this will lower connection, collocation and backhaul costs for new and existing rural networks who interconnect with these POPs. These POPs would also provide a robust fiber backhaul network to strengthen new or existing wireless and cellular coverage in rural Maine.

6. **Provide support to NNENIX** to facilitate interconnection between Maine networks.

Robust Internet Exchange Point (IXP) infrastructure in Maine will manage and promote interconnection between Maine networks and wholesale providers, to maximize the value returned from the investments in middle-mile fiber and CPoPs. This should significantly reduce the cost of moving traffic among small local or regional Maine networks, and provide additional connections to wholesale networks that currently traverse, but do not offer a POP in Maine. IXP revenue is typically generated in the form of membership, port, and service fees charged to participants in the exchange.