

OSHEAN Beacon 2.0 Network

SERVICE DESCRIPTION

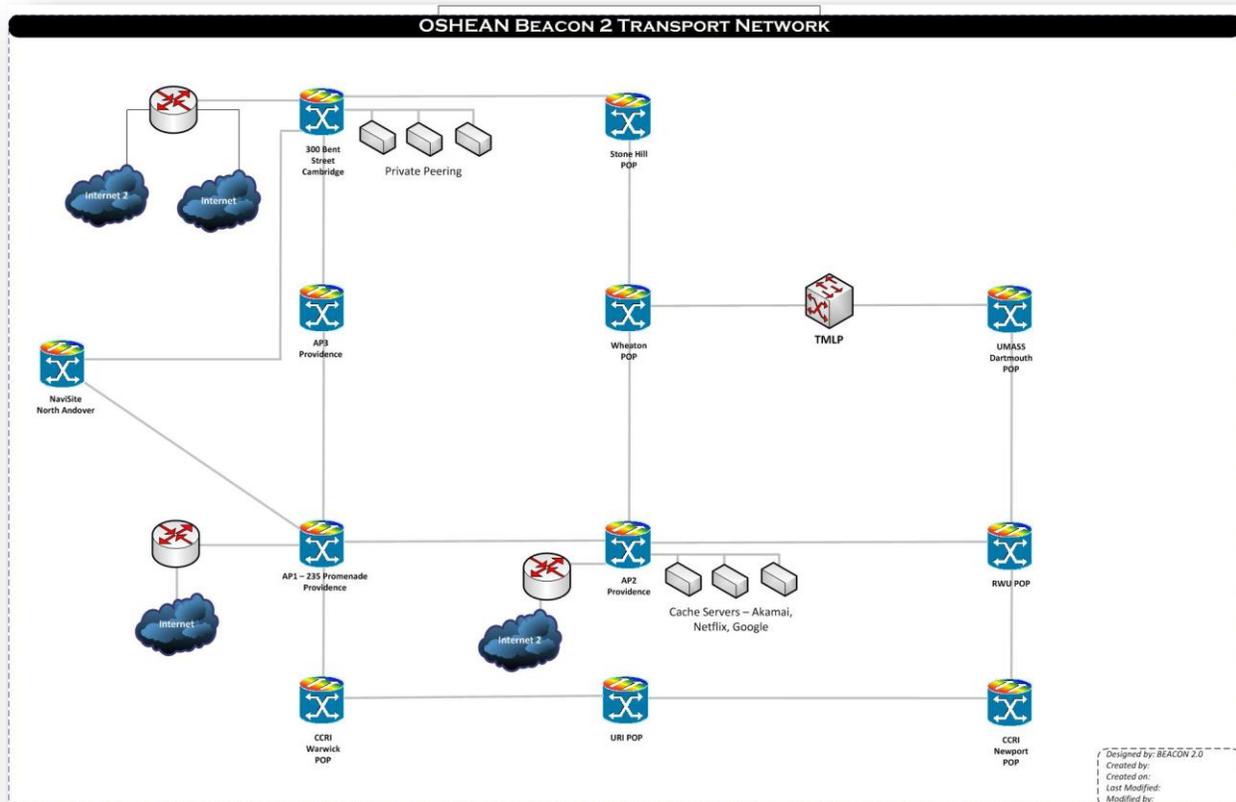


OSHEAN Beacon 2.0 Network

INTRODUCTION

Over the last few years, OSHEAN's 500+ mile Beacon 2.0 network has become one of the finest infrastructures of its type in the country. Built in large part off a \$32M federal grant, OSHEAN connects over 150 members including all of Rhode Island's higher education institutions and 13 colleges in MA, RI's largest state health care organizations, a large majority of the States K12 schools and libraries and a significant portion of RI's State Government. The OSHEAN membership enjoys the security, performance and flexibility of a private network infrastructure within a regional collaborative as well as global internetworking through multiple IP gateways.

The Beacon 2.0 middle mile core network is a private 48 strand optical network. Strands can be offered as lit or dark services and configured in either point to point, point to multipoint or fully meshed topologies.



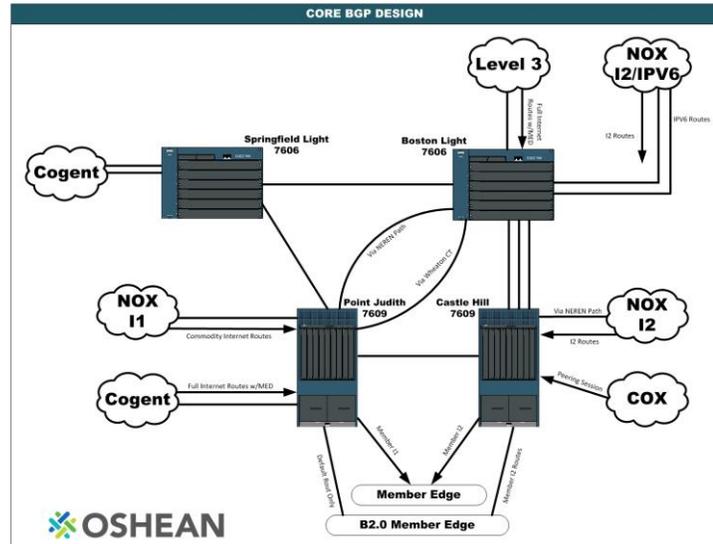
TECHNOLOGY PLATFORM AND RESILIENCE

The Beacon2 network is a state-of-the-art optical network built on Cisco's 15454 Dense Wavelength Division Multiplexing (DWDM) systems and Carrier Packet Transport (CPT) platform. The power of this network enables OSHEAN to offer cutting-edge transport and IP services to Members at greater speeds and lower cost than other providers. The Network is designed with a highly resilient multi-layer architecture. The network infrastructure is best described as a VPLS meshed architecture with multiple and diverse BGP routes, to and from, core nodes. The meshed topology affords many options for data traffic seeking alternate routes and ensures no single point of failure. The fault tolerant design, with 50 millisecond (ms) path failover, adds a layer of redundancy required to meet the most demanding network

service level agreements (SLA's). The Beacon2 network leverages advancements in DWDM technology to meet the future needs of networking capacity and bandwidth. Today, OSHEAN is able to multiplex 40 DWDM wavelengths (each capable of 100Gbit) on a single pair of fiber. With 24 pairs of fiber strands available, that equates to a bandwidth pipe of approximately 100,000Gbit (100Terabit). In addition, future advancements in line cards and optics creates the potential for limitless bandwidth – making Beacon 2.0 a network capable of serving Members for years to come.

Beacon2 “Lit Services” provide OSHEAN Members with Ethernet port interface(s) to fit a variety of packet switched networking applications – including bridging of distant local area networks or creating high speed gateways to the public internet.

Internetworking this large amount of data, quickly & reliably, is achieved by the use of Multi-Protocol Label Switching (MPLS) and Border Gateway Protocol (BGP) routing. MPLS is a scalable switching protocol ideally suited to carry native Ethernet frames and IP packets. By design, MPLS reduces latency across the network and improves user experience particularly with bandwidth intense applications. In addition, Beacon2 maintains multiple vendor peering points with commodity Internet suppliers and employs BGP routing at the network's edges. This complete infrastructure affords OSHEAN members to aggregate multiple network services in a consistent way, be it site-to-site, site to partner, commodity internet, private peering partners, or “ON-NET” offerings.



NETWORK CACHES

The Beacon 2 network is fitted with “on-net” caching systems designed to deliver popular IP-content locally. This means that much of the traffic to these popular sites does not traverse the commodity Internet Peering points. Local caching greatly enhances download performance due to the low number of hops and direct fiber connections. By keeping this traffic “on-net”, members enjoy reduced commodity internet pricing and very high performance. Caching servers are particularly important in dealing with traffic spikes associated with events such as Microsoft and Apple updates. OSHEAN currently has relationships with Google, Netflix and Akamai to house their caching servers in our major hub locations. On average, these caching servers handle approximately 35% of IP/Internet content requested from the OSHEAN membership.

NAVISITE-VIRTUAL PRIVATE CLOUD (VPC)

OSHEAN has brought a truly unique offering to our Members by combining our Beacon 2.0 state-of-the-art fiber and IP services network with a world-class cloud infrastructure supported by NaviSite. The powerful combination of OSHEAN's Beacon 2.0 Network and NaviSite's cloud infrastructure is designed to overcome security, variability and latency issues typical with the commodity Internet and commercial Cloud providers. NaviSite, <http://www.navisite.com> a Time Warner Cable Company and leading cloud service provider, has 12 SSAE-16 global data centers and four IaaS cloud nodes. Most notable is their Andover, MA flagship data center. This Tier 3 facility is a world class data center and is “on-net” for

OSHEAN Members. Connected via multiple 10Gbit, diversely routed, fiber connections OSHEANs VPC services deliver unprecedented speed, security and network availability needed for virtualized applications such as cloud bursting, business continuity and disaster recovery.

THE RI STATE DATA CENTER

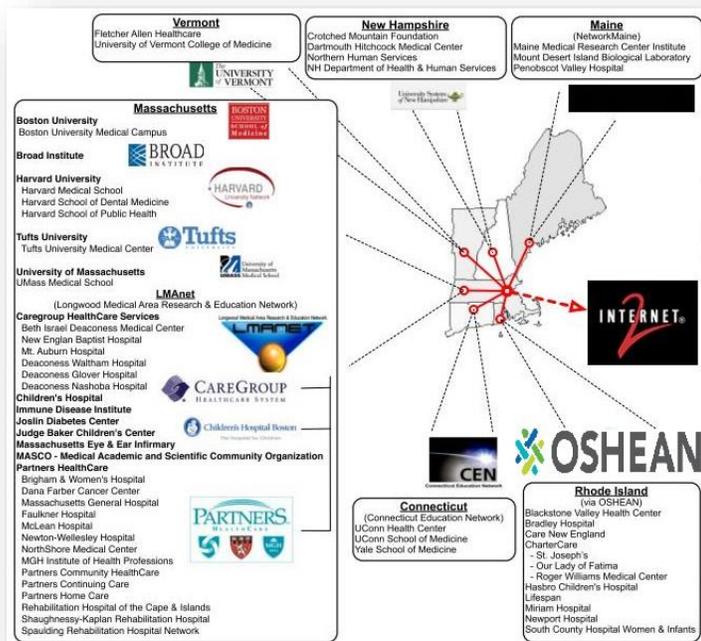
The RI Department of IT (DoIT) Warwick data center is a critical asset to the States agencies, colleges and universities, K-12 schools, Libraries and municipal governments. This new, advanced facility is equipped with all the requisite features of a modern data center and is staffed with qualified personnel 7 days a week, 24 hours a day. The data center has advanced temperature controls, un-interrupted DC power supplies and backup power generators. The facility is also remotely backed up by a Sungard disaster site in New Jersey.

The State Data Center is a point of presence (POP) on OSHEANs core backbone. Members, with State affiliation, have an excellent on-net option for either primary or backup data center real estate. Connected with a 10Gbps fiber run, OSHEAN members can remotely access their IT assets, housed within the data center, through a firewalled VPN or bridged network configuration.

REGIONAL PARTNER PEERING

OSHEAN is a founding member of the Northeast Regional Education Network (NEREN) <http://www.neren.org> which operates a fiber network throughout New England. This collaborative

relationship, with regional network partners, greatly increases options for our membership. NEREN operates a fiber ring that connects important North East data centers in Hartford, Springfield, Worcester, Cambridge and Providence. In Cambridge, OSHEAN also connects with the Northern Crossroads (NoX) <http://www.nox.org/> GigaPop. The NoX is operated by MIT, BU and Harvard and provides regional connectivity to important peering points such as Internet 2. Through the NEREN and NoX partnerships, OSHEAN members can link with other regional networks such as UMASS Net, the Connecticut Education Network (CEN), CapeNet and Network Maine. These Regional partners have on-net assets including the newly constructed Mass Green High Performance Computing Center <http://www.mghpcc.org> in Holyoke. Additionally, the below diagram highlights regional health care applications which take advantage of the network collaborative.



INTERNET 2

OSHEAN is the Regional Network Connector for Internet 2 <http://www.internet2.edu>, the Nationwide 100Gbps research and education backbone. Internet 2 (I2) sites and services are accessible by all on-net OSHEAN members. Built by and for the research and education community, the Internet2 Network offers

8.8 Terabits of capacity and 100 gigabit Ethernet technology on its entire footprint. I2 offers a portfolio of layer 1, 2 and 3 services as well as a significant suite of cloud and application services under the Net+ program. OSHEANs Beacon 2.0 network has direct and diverse access to I2 peering points for tight integration and networking with the I2 community.