

The Ammon Model: Open Access Virtual Infrastructure

Open Access Virtual Infrastructure (OAVI) makes the actual *infrastructure* available to the end user through the use of virtualization, rather than the infrastructure's *service(s)*.

Why this matters:

OAVI enhances consumer choice by separating the underlying physical infrastructure from the network service(s). Each end user is empowered by being presented with his own infrastructure. As a result, every user has the ability to receive and/or deliver services across the infrastructure by utilizing a self-provisioned network or by joining a network provided by any other user by joint agreement.

This is a change from the traditional Open Access Network (OAN) model where there is simply an "organizational separation" between the infrastructure owner and the service provider(s). For example, the traditional 2 layer OAN model consists of a single entity *network* owner and operator, and expects multiple retail service providers to deliver services over the network, while the traditional 3 layer OAN model requires a separate *network* owner and operator, with the same expectation of multiple retail service providers. The OAVI model consists of an *infrastructure* operator and *infrastructure* users.

OAVI supports net neutrality as the infrastructure owner is providing infrastructure to all users without discrimination rather than network service(s). The infrastructure owner's incentives are clarified by creating a clear separation between the physical infrastructure and the multiple user networks operating across the infrastructure. The specific characteristics of each individual network, including performance, are determined by the user(s) infrastructure selection and network provisioning. Therefore, the treatment of the data lies outside of the infrastructure operator's purview. User costs are not based on network utilization but on infrastructure consumption.

OAVI represents a shift from traditional models where both providers and subscribers are often charged for network usage without relation to infrastructure costs, availability or capacity. In other words, if the infrastructure owner is compensated for reselling infrastructure rather than network services the natural effect will be the creation of a marketplace wherein competitive forces will reduce the cost of network services to simple commodity pricing. The incentives for openness and efficiency will be maintained. Resulting network availability, including bandwidth, will transition from scarce to abundant. OAVI, therefore, presents the infrastructure as a utility.

OAVI enables Innovation as the barrier(s) to virtual infrastructure ownership are eliminated. In a true OAVI model there is no distinction between providers and subscribers, as all users on the infrastructure have equal access to the infrastructure through virtualization.

OAVI also reduces costs through infrastructure sharing made possible by virtualizing the infrastructure thereby allowing multiple instances of the infrastructure to be presented to users.

Technical Aspects:

While the purpose of this paper is not to address in detail the technical aspects of OAVI, it should be noted that an absolute commitment to the proper architectural framework is required when designing and implementing the infrastructure in order for it to be presented to the end users as a generic utility. Therefore, to meet the definition of OAVI, as used here, the user must be presented with a virtual wire from edge to edge with a minimum capacity of 1 gigabit per second. Additionally, because the

infrastructure is virtualized, the user must be able to create as many virtual wires as desired on the physical infrastructure. In practice, this functionality will make it possible for a user to provide or receive multiple instances of the same or different network services on the same physical infrastructure.

Financial Model:

Experience proves that economic forces will determine the success and drive the evolution of any given model. Therefore, it is essential that the correct economic model be applied to the OAVI.

Ubiquity and economy of scale are both critical to the success of presenting infrastructure as a utility. In addition, clear incentives for the infrastructure owner must be maintained. For these reasons, an economic model similar to those used by utilities would be most applicable. The City of Ammon is an incorporated municipality in the state of Idaho which believes that an OAVI as described here could be well served by a municipal utility under the following economic model:

1. Within the municipal framework, utility infrastructure build costs are paid by the property owners desiring the utility service. This could be done via a standard municipal bond process which requires the support of the property owners who will receive the utility service.
2. Also, within the municipal framework, the utility infrastructure maintenance and operational costs are paid by the property owners with access to the utility via a monthly utility service fee. It is important to note, that under the OAVI model, the utility service is *virtualized infrastructure*.

In practical terms, the costs to the user would come in two forms:

The costs for building the infrastructure would be paid back through property tax. As an example, an average community might expect to pay \$3,000 per property to build out the OAVI. If this were funded with a 20 year municipal bond at 2%, the payments would be \$182.16 per year or \$15.18 per month.

The costs for maintaining and operating the infrastructure would be paid with a monthly utility service fee which should average between \$15 and \$25 per month depending on the scale and operational costs associated with the infrastructure.

The monthly cost to the user would total between \$30 and \$40 per month for the first 20 years, with the potential to diminish to \$15 to \$25 per month after the build costs are paid. This potential to diminish, however, assumes that the monthly utility fee adequately provides for asset depreciation and replacement, as well as inflation.

It must be noted that none of these fees provides for what might be considered a retail network service unless the service desired by the user is infrastructure between two or more locations served by the OAVI. Services such as the Internet, VoIP or IPTV should be available and could be delivered across the OAVI with an agreement between the provider and the end user. In this instance the end user is the service provider's customer. Conceptually, when the end user desires a service other than his or her own, the OAVI model puts the end user in the middle of the network service provider and the infrastructure owner, thereby improving consumer choice and control.

Conclusion:

Implementing an OAVI utility with the wrong economic model would likely result in an Open Access Network with a different underlying technical architecture. Currently, infrastructure owners do discriminate by charging differing rates based on service type, service owner or whether or not they perceive a user to be a 'service provider'. They do so, paradoxically, while providing infrastructure which is isolated from those concerns and whose cost is fixed regardless of utilization. The inherent benefits of the OAVI model would be destroyed in the presence of such discrimination, as the economic model is completely disconnected from the operational model. Therefore, neither the operational or economic model will function correctly without the other.

Correctly implemented OAVI has the potential to address a national need by changing the broadband paradigm. Consider the following:

1. Most experts agree that broadband today is largely a natural monopoly.
2. Broadband regulation via antitrust and consumer-protection laws has proven deficient.
3. Broadband is arguably already a public utility.

An OAVI municipal utility has the ability to address these needs by creating a self-regulating infrastructure, and placing that regulation where it belongs: on the infrastructure, not the service. This will allow the fixed costs of building, operating and maintaining the infrastructure to be equitably apportioned amongst the users. In return the infrastructure is guaranteed and is equally available to all utility members. Network services, including bandwidth will become a commodity; open and abundantly available to all. Barriers to innovation will disappear as utility members may be providers or subscribers, or even both without discrimination in treatment or costs.