# Future State for Service Providers: Ready or Not?

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Cable has entertained the masses with video packages for years. But, everything has changed. MSOs and fiber-enabled telcos are now ISPs, first and foremost. High speed data now rules the roost. It has become the enabler to video competition. Over the Top [OTT] companies have cracked the code and ride virtually free while growing subscription and ad revenue.

**How did we get here?**

**Where should we go from here?**

Let us start with an examination of the fundamentals of the Service Provider's current infrastructure. Then, look at the transition to virtualization and ultimately the commoditization of broadband. We will then highlight the steps Service Providers should enact to streamline operations, simplify complex domains and open new revenue opportunities.

**We will help you answer questions such as …**
- *How can I profit from my competitors' use of my facilities?*
- *What can I do to defend against cord-cutting and cord-shaving?*
- *Internet Access in 2025. Do my customers really need 100G to their doors?*

## Introduction

Transport services are already commoditized, and access services are quickly becoming so. Not only are telco and MSO facilities in play, new entrants with fiber or wireless infrastructure are already here. Network speed has become "table stakes" – everyone needs reliable speedy networks in order to play in  the access business. The new "feature" is low latency, which is required for gaming, virtual reality/augmented reality, and IoT services.

Edge services are growing, and often have nothing to do with the MSOs themselves. This leads to an erosion of revenues for the MSOs. (figure 1) However, opportunities abound. MSOs have assets that are uniquely desirable by those providing these services: facilities, people and expertise.

MSOs have some experience hosting servers for outsiders, such as Netflix and Akamai. These efforts should greatly expand. New standards developed for the shared data center will permit the MSO to host many server customers on a single type of platform. Operational efficiencies gained through the use of Remote PHY technologies can free up space and power to enable many headends to become data centers. A commercial data center operator might just have one facility for a city or region, but an MSO could create many such centers throughout a city. Shortening the transmission path can provide the Edge Service customer with an "edge" in latency performance while creating a Distributed Cloud.



Jack Burton is an industry veteran and a recognized iconoclast in the Cable industry. He is an avid aviator and lives in Kings Park, New York with his wife and children.

## Overview

### Two Types of Service Providers

There are two very different types of service providers we will look at: 1) those providing the ability to transport services into the home or business, and 2) those providing resources (such as voice or video) that the customer may use via that access.

As you know, an access provider is a company that has facilities into the home or business, such as a copper, fiber, or wireless. Examples include the traditional Telephone Company and Cable Operator, and Mobile Operators / Wireless Internet Service Providers.

**It is the business of these access companies that is most threatened because for years these companies have been selling resources (television and telephony) as their main products, and access only as an incidental part.**

At the beginning of the Cable Industry in the 1950's, television was the only product – starting with traditional programming and channels. Cable television channels were first added to that mix in the 80s. In the 2000s, telephony was added along with internet access and internet services such as e-mail.

While telephony and internet services were available from others before Cable entered those businesses, Cable quickly grew and surpassed their rivals. This was primarily due to their superior access networks and the bundling of these services with one another.

Resource providers that use access over-the-top, separate from the access providers are a relatively new phenomenon.  We will call these Edge Services Providers. Let us look at a few broad categories:
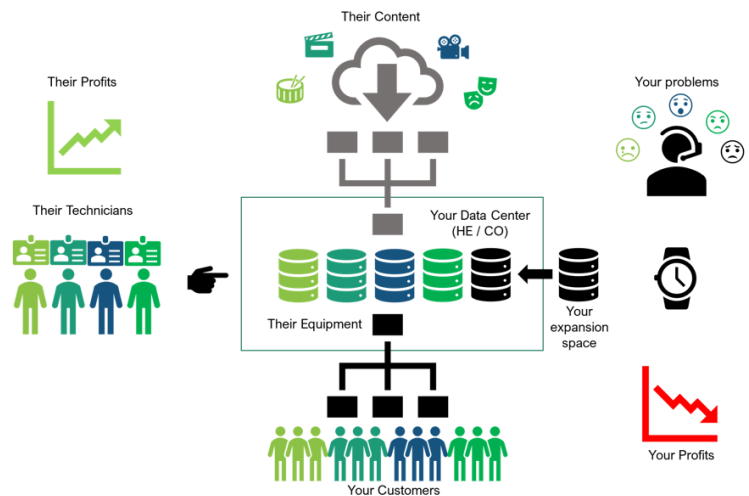
### Video

Netflix is the giant in the field of over-the-top video. However, others such as Hulu, Vudu,  and DirecTV Now are growing. Programmers such as ABC/Disney, BBC, and Fox also have their own

Figure 1
**The Current Environment for Service Providers**

## Present Mode of Operation

- Subscription & advertising revenue is lucrative for programmers
- Non-operator personnel installs technology in HEs at operator expense
- Space, Power and OPEX erodes budget
- Quality issues are confusing and construed as the operators fault regardless of cause
- Cord cutting and shaving is a byproduct of direct customer relationships putting pressure on growth
- Burden placed on ISP for speed and capacity at lower cost per bit

services that they sell directly to customers. AT&T's acquisition of Time Warner, which includes HBO and Turner networks, adds a major carrier to the list of OTT players. Walmart recently announced their intention to enter the video program distribution field creating another deep-pocketed competitor.

Netflix also had the distinction of re-inventing the CDN (Content Delivery Network) through their private OpenConnect platform located at the facilities of Service Provider partners.

### Voice

Vonage was an early entrant in the over-the- top telephony space. Others such as Packet 8, Ring Central, and Magic Jack have come along. More recently, enterprise-grade services such as Bandwidth.com and vendor-created endeavors such as Kandy from Ribbon Communications offer business many options.

### Internet

Alternatives to Service Provider e-mail and web hosting were always available. They have become increasingly popular. Many customers select a third-party e-mail provider so that they are able to switch access providers more easily. Mega-providers such as Google and Microsoft have largely replaced AOL as the largest non-

service-provider e-mail service. In a twist, the AOL system provides Verizon's e-mail services.

## A Deeper Look

### Video

In the Video category, the damage to the traditional cable business has already started. News reports about the "cord cutting" and "cord shaving" phenomenon abound. No cable provider has shown any significant growth in their video subscriber counts in many years, and most have suffered significant losses. In 2017, revenue from video comprised less than 50% of MSO revenue (Figure 2) .
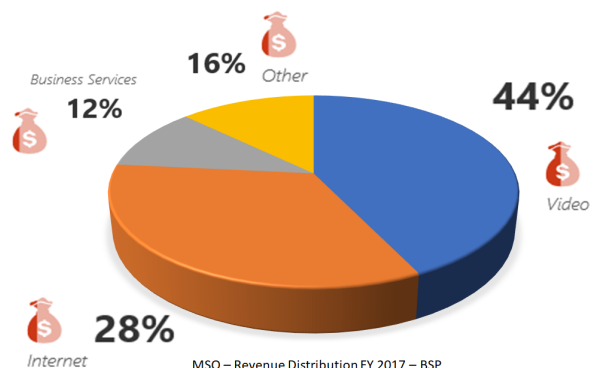
Why is this? Why are OTT providers able to offer



Figure 2
**2017 Revenue by Product
North American Tier 1 MSOs**

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what customers want for less money? Many would put the blame for this on the programmers. Their constant increases in per-subscriber fees, which are passed along from the Service Provider to their customers, have become more than many households wish to bear. Service Provider contracts usually do not permit packaging of programming in a way that would permit any customer to significantly reduce their bill by removing channels they do not want to view.

Another way the programmers are encouraging OTT is via their own offerings. Services such as HBO Now, BBC Player, and ESPN Plus permit customers to buy their favorite programming outside of a cable video package. Customers can also get content via live streams from a variety of legal and not-so-legal sources.

**A great defensive measure** would be for Service Providers to wholesale packages of (otherwise) OTT programming the same way other aggregators do - if their contracts permitted. Direct TV Now and Sling TV (Dish) are examples of this from satellite providers.

Short of wholesale, the Service Provider could offer access to OTT programming via the Service Provider's set-top devices and apps. In this way, the customer remains tied to the Service Provider's service, even as they obtain some of their programming material from others.

## Voice

On the residential telephony front, the reason for declining subscriber numbers is different. Here, customers are not flocking to OTT telephony providers, they are disconnecting completely. This is because the telephone has transitioned from a household-based service to a personal one, and the devices have changed from landline to wireless. We do not believe there is any way for a Service Provider to reverse or even slow this trend. However, by

entering the Wireless business in some way, much of the revenue lost could be recovered.

Comcast and Charter each have a relationship with Verizon Wireless, and Altice USA has one with Sprint. While these MVNO arrangements are different, they enable the MSOs to sell mobile services. The Altice arrangement also provides microcell equipment access via the cable plant. Cooperative arrangements are not just limited to the largest Service Providers. For example, Hay Communications, a small cooperative operator in Southern Ontario, has a cellular resale arrangement.

Looking at commercial telephony, the landline is still king. The challengers here are OTT providers that offer specialized business phone services, such as Hosted PBX (IP Centrex), WebRTC (Web Real-Time Communications), and CPaaS (Communications Provider as a Service).

Hosted PBX services allow the business customer to outsource the functions formerly performed by an on-premises switch. Telephone extensions which used to be wired to the switch are instead IP devices whose signals ride the customer's LAN. The switch, which became packet-based only several years ago, can now be remoted to an outside provider. The trunk lines connecting the switch to the outside world may not even come from a traditional provider at all.

There is still some life left in providing IP-based

trunking to IP PBXs on premise. However, profit margins for this service are slim and decreasing. Competitive trunking services are available not only from familiar telephony names like Vonage and Bandwidth.com, but also from Microsoft and Google.

WebRTC (Web Real-Time Communications) allows customer-service based business to communicate with their customers through Web Browser voice connections. This will not displace telephone-based contact; it will supplement it. CPaaS (Communications Provider as a Service) is an extension of Hosted PBX to a fully cloud-based system running on generic hardware. The CPaaS provider might not even host a single server at their own data center, letting their software reside on a hosting service. Some of these services do not even require a telephone: the customer's wireline device is replaced by an app running on a PC, smartphone, or tablet.

**Where can a Service Provider make money from telephony in the face of all this?**

Well, the new entrants have a significant problem: they do not have a field force. The Service Provider could make their field technicians available to the new entrants, for a price, to assist their customers on site (at their facilities) and in person (in front of their customers).

Internet

Competition in the Internet Services area is already mature. Service Provider supplied email addresses are not portable. Generic e-mail services, such as pobox.com and Gmail allow users to switch providers without losing their address. These services may have features that a Service Provider-supplied service does not, such as text-to-speech conversion of e-mail, speech to text conversion of voicemail, and specialized apps. Because many of these OTT services are free, it is impossible for a local Service Provider to profitably compete. E-mail becomes an also-ran service and therefore a spiral of declining value leading to declining service is created. Verizon already abandoned its in-house service, moving its

customers to its AOL acquisition for e-mail.

Basic Domain Name Services (DNS) directory servers are always supplied by an ISP, but lately competition here has emerged. Free DNS from Google (8.8.8.8) and Cloudflare (1.1.1.1) are increasingly popular.

Other internet services are plentiful and would probably not be the purview of a Service Provider. Everything from shopping to funny cat videos have leading providers and customers. Indeed, the internet is the highway and these sites are the stores.

**What can a Service Provider do?** Rather than trying to replace the e-stores of the Internet, the Service Provider can become a real-estate provider. Service Providers have local facilities strategically located in many communities – their headends and central offices. By converting these facilities into data centers usable by edge services providers, Service Providers can turn these expense centers into profit centers. With the edge servers under MSO supervision, the Service Providers can also do more to ease the relationship between the OTT edge service and the Service Provider access service by providing timely notice of performance issues, bandwidth constraints,  or other problems by not only notifying the customer but also pro-actively resolving these matters.

# Why did the rise of OTT happen?

Service providers may grouse about the loss of edge services business to OTT entrants. However, the main enablers of these entrants are the Service Providers themselves.

In the early days of DOCSIS, bandwidth was greater than previously available with dial-up, but still was limited. A DOCSIS service group might consist of as many as 2000 homes, all sharing a downstream bandwidth of less than 40 Mb/s and an upstream bandwidth of 5 Mb/s on a single upstream and downstream channel. That sharing made real-time streaming of video unimaginable, and real-time voice

communications challenging if, for example, an upstream file transfer was to accompany several simultaneous phone calls.

PacketCable was developed along with DOCSIS 2.0. Now, voice calls could be prioritized so that the file transfers would wait. This worked wonderfully well, and for a while Service Provider voice services had superior performance to OTT services.

The demand for bandwidth kept increasing, and Service Providers obliged. DOCSIS 3.0 channel bonding and DOCSIS 3.1's new modulation methods enabled much greater speeds. Telephone Service Providers rolled out GPON. Throughout the 2010s (*indeed, since the 1980s*), bandwidth demand and supply doubled every year. Today, capacity approaching 1 Gbps downstream and hundreds of Mbps upstream is commonplace.

What has this done to PacketCable, and prioritization of traffic? For the most part, it has rendered it moot. *When bandwidth is 'unlimited', there is no congestion and thus no need to prioritize.* Without congestion, an OTT edge Service Provider is able to get traffic through virtually just as well as an in-house prioritized service. Not only are voice OTT players able to compete, but video OTT players can thrive as well. Most believe that with advances in video coding less than 20 Mbps could support a 4k TV stream. That can be accommodated by a 1Gbps access network serving dozens of customers in a service group, and that is what most modern MSOs are building for the near future, in effect cementing the commoditization of their own edge services.

**Will this go on unabated?** The need for priority treatment of video packets could return if bandwidth demand exceeds supply. Virtual Reality bandwidth demand could exceed 100 Mbps per user, which could challenge capacity. In this case, a revisit to PacketCable Multimedia may be required. In any event, it is not something to be counted on for a lucrative

future in the transport of OTT bits. Also, while current net neutrality regulations (or lack thereof) may permit charging an OTT provider for priority treatment of their streams, there is no guarantee that the regulatory environment will not change.

## The New World

Internet Access will become a commodity. There is no escaping this fact. Customers (rightly) expect any internet service they purchase to provide access to the entire internet, any service, any protocol and do so reliably at the speed tier level they purchased. Further, they expect that the Edge Services they use from the internet to be delivered without any involvement of the Access Provider.

Access competition is increasing. In most cases, customers can choose between access provided by a Telco using copper of fiber facilities, or a Cableco using coax and/or fiber facilities. In rural areas, Wireless ISPs may be found, as well as Satellite providers. There are indeed still some non-broadband areas of the country, however with increasing fixed and mobile wireless options and possible government support these service 'holes' will eventually be eliminated.

Television service is increasingly becoming just an "app" riding on Internet Access. Streaming services will ultimately replace conventional video services from Service Providers.

Most urban areas have multiple fiber access providers available serving businesses. In urban and suburban areas, fixed wireless providers will also deploy new networks that will provide residential and business customers with additional choices.

By using one of the options for internet access, a customer can connect to their choice of services from a plethora of Edge Service Providers. These edge services can range from simple, vanilla products such as residential voice telephone lines to the most complex managed cloud-based e-commerce solutions.

Access speed, while an important feature today, will quickly become much less important as all providers approach 1 Gbps. Mobility, ease of use, and network quality will be key differentiators.

## Table Stakes

**What must MSOs and other Access Providers do in order to remain in the game and remain relevant?**

Well, for one, they must continue to provide the level of Internet Access that customers expect. This means adequate bandwidth and latency performance 24x7. Network performance must be carefully monitored. Any detected problems in reliability or congestion must be addressed. Bandwidth upgrades must continue in order to remain ahead of bandwidth demand. Higher speed and lower latency products must match or exceed the capabilities of competitors.

Unfortunately, when doing all of the things they must do, Access Providers will be paid less and less for doing it. The revenue per megabit per second will continue to decline.

Access Providers can address the declining margin through increased operating efficiency. New technologies such as Remote PHY can (over time) reduce costs through reduced operating costs both in terms of manpower and headend space and power. Operating costs can further be reduced by migrating to an all-fiber network.

The Edge Services products offered by Access Providers are fairly limited. However, they must remain available in order to avoid forcing customers elsewhere. One opportunity for cost reduction would be to outsource these services to cloud-based providers. For example, the residential voice service deployed using end-of-life soft switches feeding legacy T1 trunks could be replaced by an all-IP service from a third party external provider.

Even after doing all of this, the Access Provider will likely still be challenged to stay in growth mode. New opportunities must be explored.

## Opportunities

Here are some ways that a Service Provider can use their assets to profit in the New World of OTT and new competitive Access Providers. (figure 3)

**"By leveraging their Facilities, Expertise and People, a Service Provider can pursue a variety of new business opportunities."**

## Facilities

### Access Provider Platform

New wireless Access Providers (such as Starry) will be placing base station radios all over the landscape in order to reach their customers with short-range line-of-sight radio equipment. These radios must ultimately connect back to the Access Provider's own network infrastructure. Incumbent Service Providers have several opportunities in this market:

### Backhaul

Connection of the radios to the Access Provider Network can be provided using the Service Provider's fiber or HFC network. Circuits can be sold to provide this connectivity.

### Radio Platform

The Service Provider's right-of-way, including existing Outside Plant facilities could be used to locate base station equipment for the wireless Access Provider. Depending upon rules from the provider of pole attachments to the Service Provider, space could be sublet to the wireless Access Provider or wireless equipment could be adopted by the Service Provider. The location of the equipment is one possible revenue stream, maintenance of that equipment is another. With the Service Provider's fleet of vehicles and trained RF-experienced field staff, there is a great opportunity for agreements that could benefit both companies.

### Access Helper

In a rural or plant extension area, a wireless Access Provider could help a wired Access Provider reach new customers for their services, turning the idea of OTT on its head.

## Mobile Network Access Platform

Closely related to the opportunity presented by new wireless Access Providers, incumbent mobile operators such as AT&T, Verizon, and T-Mobile/Sprint will be placing 5G base station equipment in many new locations.

### Backhaul

As with the new wireless Access Providers, connection of the small cell radios to the Mobile Network can be provided using the Service Provider's fiber or HFC network.

### Small Cell Platform

The Service Provider's right-of-way, including existing Outside Plant facilities could be used to locate small cell equipment for the mobile network. Depending upon rules from the provider of pole attachments to the Service Provider, space could be sublet to the mobile network provider or wireless equipment could be adopted by the Service Provider. The same opportunities for both location of the equipment and maintenance of that equipment are available.

## People

### In-Home/In-Office Service Force

The army of technicians that MSOs have at their disposal is already trained and equipped to provide on-premises customer care. Extending that capability to 3rd Party could be fairly simple.

### Installing and Maintaining CPE

A provider of OTT television services could have technicians install or service their set-top boxes. A business telephone service provider would have someone to do station installation at the customer's office. A firewall provider could have help installing on-premises appliances. Even a provider of SD-WAN based specialized WAN services could have a trained workforce to help place access devices at customer sites, perhaps tied in to Internet Access services from the Service Provider.

A huge opportunity exists in the health care arena. Patients can teleconference with their doctors using a standard laptop computer, tablet, or phone. However, new accessories in electronic monitoring of vital signs can take this to another level. Blood pressure, blood sugar, heart rhythm, and other parameters can be detected and reports sent to a customer's physician. Even medication reminders and automatic pill dispensers can be hooked up. While this equipment will be designed for self-installation and use Over the Top of any broadband network, many customers will require assistance; assistance that a Service Provider's field force can deliver.

There are several approaches available to entry in this field – the Service Provider could partner with medical equipment vendors, regional health care providers, individual doctors, or go directly to the end customers.

### Custom Installation Services

Today, many customers have high-end entertainment systems, home automation, or security devices. Even those that are designed for self-installation may be to complex for many to handle. The MSO's field service forces could provide the assistance needed to help get these installations finished.

### Wireless Network Assistance

Troubleshooting customer's wireless networks has already become the major chore of MSO field forces. By expanding and charging for this assistance, a cost center may be turned into a profit center. Tools are available that MSOs can use to make this much easier than a customer could hope to do on their own; items that the technicians require anyway when working on the MSO's own managed routers at customer locations.

### Customer Database

The existing customers of a Service Provider represent a group already consuming access and edge services, at a minimum from the provider itself. These customers can be targeted with offers from Edge Services partners.

### Packaged Edge Service Offer

A provider of OTT television services could sell their services through the Service Provider's billing and customer service systems. Of course, such an offer would no longer be "OTT".

Managed telephony service providers could also sell through the Service Provider's business services team.

### Simple Database Sale

Within limits of regulations, such as the Cable Act, a Service Provider may in some cases sell their customer lists to others.

### Complex Data Analytics

Many Service Providers have begun to use sophisticated analysis tools and methods to look at the behavior of their customers (in aggregated form) in terms of what they watch and what they buy, and when. This information is not only valuable to the Service Provider itself, but potentially to OTT players. While also subject to limits of regulations, a Service Provider may in some cases sell this analytical information.

## Facilities & People

### Transition of the Data Center

The idea of transforming a Service Provider origination facility into a computing location is nothing new, but turning it from a simple equipment repository into a profit center is.

First of all, let's look at the world that we are in today. An MSO, for example, may be hosting equipment for one or more OTT video service providers in many of their headends. The MSO provides the space and power, the cooling, and access to their facilities. In return, the Edge Provider is able to offer a better experience to their customers.
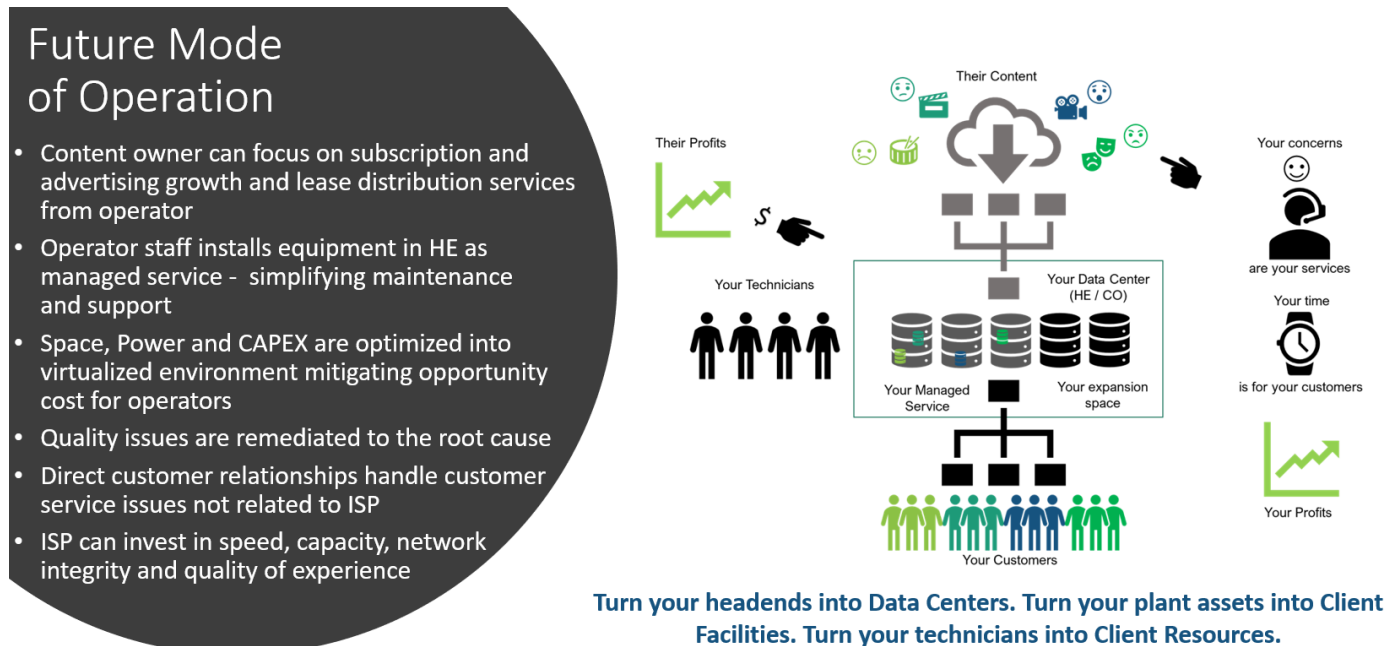
This model is flawed for the Service Provider. While they are indeed serving their customers better by providing a better OTT experience, this act of benevolence is invisible to their customers. More importantly, they are not compensated for doing it. Is there a better way?

### Data Center / CDN Provider

With headend or central offices throughout a community, an MSO or Telco has the raw

Figure 3
**The "As a Service" Model for Service Providers**



## Future Mode of Operation

- Content owner can focus on subscription and advertising growth and lease distribution services from operator
- Operator staff installs equipment in HE as managed service - simplifying maintenance and support
- Space, Power and CAPEX are optimized into virtualized environment mitigating opportunity cost for operators
- Quality issues are remediated to the root cause
- Direct customer relationships handle customer service issues not related to ISP
- ISP can invest in speed, capacity, network integrity and quality of experience

**Turn your headends into Data Centers. Turn your plant assets into Client Facilities. Turn your technicians into Client Resources.**

facilities to enter the business of supplying server resources to Edge Service Providers. CORD (Central Office Reconfigured as a Data center) and HERD (HeadEnd Reconfigured as a Data Center) are initiatives that hope to bring standardization toward this end. If successful, Service Providers will be able to run standardized multi-client server farms in order to fulfill not only the present demand for content caching and storage, but the future demand for ultra-low-latency between end users and servers.

Service Providers have many options on how to enter the data center business.

## Purpose-Built Server from Edge Service Provider

Pioneered by Netflix with their OpenConnect platform, an Edge Service Provider creates a server platform specifically designed, built, and managed by themselves for their exclusive use. Service Providers merely provide space and power for these servers. HBO, Akamai, Limelight, and Hulu are also following this model. As described in the introduction, this arrangement typically does not provide any financial compensation to the Service Provider and is therefore less than ideal.

This model may also be expanded to allow the Service Provider to provide additional resources to the Edge provider, such as monitoring and maintenance of their servers. The specialized servers could also be purchased/owned by the Service Provider and services sold back.

## Generic Server Platform for use by Edge Service Providers

The Service Provider would purchase, install, and maintain an array of generic servers which would run the software provided by the Edge Service Providers to house their content. This could be a good choice in order to have a platform useful to Edge Service Providers other than for video CDN use.

The Service Provider could enter the same business that companies such as AWS provide on a much larger scale.

The drawback to this model is that today there are not many services that would immediately benefit from a distributed-cloud model, putting the server infrastructure within miles of the users. That may change in the future (see "the Distributed Cloud" below).

## Operating Multiple Private CDNs – Challenges and Opportunities

Does the Service Provider want to provide access to multiple 3rd party providers so that they can manage their servers (in the Netflix model)? It might be better to consider a maintenance arrangement where the Service Provider can perform these functions on behalf of the Edge Services Providers. Integration to trouble ticketing systems, etc. would be required.

These appliances can be monitored for performance by the Service Provider. This information could be used for many purposes, which can provide unique features in this model:

### Performance Measurement

Information could not only be collected and relayed to the Edge Service Provider, but also to their end-user customers using the Service Provider's access network. This can avoid finger-pointing.

### Equipment Diagnostics

The CDN equipment can be proactively checked and repaired by the Service Provider's personnel. ("Remote Hands")

Each of these opportunities can be offered as a monthly subscription/leased service business by the Service Provider.

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## Low Latency as a Service

Low latency is not just required where traditionally assumed; the traditional applications of video conferencing and first-person-shooter gaming are not alone.

Location of servers in a Service Provider's local

data center provides improved latency on two fronts: Reduction of the distance the packets must travel and reduction of the exposure to the routers of the internet. A remote server may be associated with a 30 millisecond or higher round trip time, while a local one can be single milliseconds.

## IoT (Internet of Things)

Sensors interacting with Medical Devices may have life-or-death consequences on data reliability and may also be delay sensitive. Automotive and Traffic Control systems which communicate between vehicles traveling at highway speeds for safety coordination are another application where extremely short latency is required.

Remote sensing is a core IoT application that is not particularly delay sensitive, however when the remote sensors are attached to a drone (Remotely Piloted Vehicle) latency becomes very important. Maneuvering of an aircraft obviously does not permit any significant delay between the observed data and the reaction of an operator or automated control system. The same principles apply if the automated vehicle is a car or truck.

## Virtual Reality

Virtual Reality is an application category that requires both high bandwidth and low latency. In order to achieve any degree of realism, a head-turn or wrist gesture must immediately be reflected visually. This requires millisecond latency and high bandwidth at the same time. Only a Service Provider with a large, uncongested pipe feeding a nearby VR server can deliver the performance that the future will require. This is the "Distributed Cloud" where a national service would provide a local server (Edge Compute) near the customer. Gaming is not the only application associated with VR! Some of the developing uses of VR will involve virtualizing the shopping experience – these merchants will not tolerate a high abandonment rate due to lag causing customer frustration. Virtual world training experiences similarly cannot afford delays that will make the simulation less real.

## Conclusion

The landscape for Service Providers has changed dramatically over the last 10 years, and indications are that the next 10 will be even more disruptive. Edge services that were once the exclusive purview of Service Providers are now available from all sorts of new players, large and small. At the same time, increasing data speeds and new competition in the access arena make it less profitable to continue business as usual.

While continuing to upgrade their networks, Service Providers must expand into new lines of business that leverage their assets. Opportunities abound in the fields of providing unique resources to new partners, new products to enable new technologies, and superior customer service to help make everything work together well.



**Broadband Success Partners is helping service providers and their suppliers prepare for the future. Given our cable network, product and marketing experience and expertise, we're ready to support your emerging initiatives. To learn about capabilities, please contact dstrauss@broadbandsuccess.com or 917.806.5567.**