colovore

HOW MUCH ARE YOU REALLY PAYING FOR THAT kW OF POWER IN YOUR DATA CENTER?

White Paper

Contents

EXECUTIVE SUMMARY

There are many approaches to structuring contracts and negotiating prices in the colocation industry. Our research shows that unaccounted overhead costs can raise the price per kW of consumed power far higher than the summary contract terms imply. The main source of this overhead is due to the simple fact that customers are forced to pay for provisioned power capacity, UPS systems, cooling capacity, floor space and other services *whether or not they are completely used.* These overhead costs need to be added to the price per kW of power consumed by equipment to give the effective, or "all-in," true price per kW. This whitepaper will provide you with the tools to calculate the true price per kW for most colocation quotations or invoices.

We illustrate our thesis with two pricing case studies, one retail and one wholesale. Both are based on invoices we audited from the 2015 Silicon Valley marketplace and represent pricing strategies often used in the industry.

In the first study, a $200/kW price for consumed power ballooned to an effective $400/kW price when overhead costs were added. In the second instance, a $140/kW price more than doubled to $364/kW when all surcharges were included.

Our studies show that colocation pricing consistently works out to costing somewhere between $300-400 per *actual consumed* kW per month—much more expensive than quotes and indicative budgetary pricing imply.

We also examine an alternative colocation model where pricing is based solely on the kW of power consumed on an as-you-go basis. The whitepaper illustrates how this pricing strategy can significantly improve your bottom line when your colocation provider also uses modern efficient technologies that allow the operational savings to be passed on to the customer.

In conclusion, we recommend that IT and financial executives analyze their colocation invoices by simply dividing the total monthly bill by the actual power consumed to calculate their true "all-in" per kW cost per month. This strategy is the only effective manner to normalize and compare colocation costs across multiple providers often employing different pricing schemes. As this whitepaper shows, the effective price can easily double when your equipment is colocated in a legacy facility with its associated legacy pricing model.

TYPICAL PRICING SCHEMES IN RETAIL AND WHOLESALE COLOCATION

Pricing schemes vary between colocation providers, and often are driven by the nature of the offering. In a retail colocation, typically the customer installs their hardware in pre-provisioned infrastructure. This infrastructure includes:

- server cabinets
- in-cabinet power distribution units (CDUs) or power strips for equipment mounted in the cabinet
- floor mounted power distribution units (PDUs) supplying branch circuit power to a number of cabinets
- branch circuit power cabling
- network cabling

This makes retail colocation deployment truly "plug and play." In a wholesale offering, the customer receives open floor space (white space) with only the floor-mounted PDUs. In this scenario, all the other infrastructure previously mentioned needs to be purchased and installed, typically at the customer's expense as a form of leasehold improvement.

The most common retail colocation pricing model consists of the provider charging a monthly rental fee for each cabinet and a monthly fee for a power circuit as the base charges. Other common monthly charges include bandwidth, cross-connect fees, smart or remote hands services, and other managed or a-la-carte services, such as managed firewalls, server rack-and-stack labor, and cabling.

Wholesale pricing models can vary significantly but typically the core components include:

- the monthly lease for the data center floor space and access to power and cooling
- power charges passed through directly from the underlying utility
- an added P.U.E. surcharge to cover the operator-provided air-conditioning, which is often a multiple of the power charge
- other various fees including bandwidth, monthly cross-connect cabling charges and ongoing fees, a share of the provider's building operating expenses, and more

Of course there is often a significant one-time upfront cost associated with the leasehold improvements required for the build out of the white space, which must be taken into consideration to arrive at the true total cost of ownership (TCO).

CASE STUDY #1

Retail Colocation Advertised Price: **"Only $200 per kW per month!"**

Customer X, a SAAS provider of supply chain management software, had been running its operations in a 3rd party colocation facility for a few years. The company managed 16 cabinets of data center equipment and believed its aggregate power draw was close to 80 kW, based on 5-kW per cabinet maximum power usage (maximum power usage, also known as "power density" is a limitation imposed by data center operators due to the facility's design.) According to the customer they had "fairly full cabinets packed with servers."

The monthly recurring colocation bill was approximately $24,000 per month, including the cabinet, power, bandwidth, and other fees. All-in, assuming 80 kW drawn, this equates to $300 per kW. The customer believed this was in keeping with the original pricing expectation upon contract signature.

The pricing methodology was a standard retail colocation pricing scheme, including a monthly fee per cabinet used, and a monthly price per power circuit delivered:

- $500 per cabinet per month
- $1000 per 30amp/ 208v circuit per month

It is important to know the *usable capacity* of a power circuit as this is a critical variable in understanding your actual costs. A 30 Amp / 208V circuit provides 5 *usable* kW at the 80% de-rated value—keeping a 20% margin of operational safety to cover unexpected spikes in load. So, in theory, for a fully-populated, cabinet consuming all 5 kW of power, this would equate to a total monthly fee of $1500 per month per cabinet, or $300 per kW all-in.

The "only $200 per kW per month" advertisement just refers to the power component of the invoice (ie, $1000 per 5 kW circuit, or $200 per kW), not the total invoice. This $200/kW is not all-in pricing. The monthly cabinet fees, actual power consumption and other add-ons must be incorporated. This will be examined next.

The Reality: **$400 per kW**

When we audited the monthly invoice, going line by line through the power usage and circuit data, we determined that actual power consumption was not the assumed 80kW. Instead, it was 60kW, a full 25% lower than expected.

Thus, the actual true cost per kW consumed was $400 per kW (monthly bill of $24,000 divided by 60 kW of actual draw). *This was 2x the advertised price of $200 per kW per month!*

WHY RETAIL COLO PRICING COSTS MORE THAN ADVERTISED

It is important to understand that this customer's experience is not uncommon. A typical retail colo scheme based upon a cabinet fee and per-circuit power fee by default forces a customer in excess of what it should be paying. Why?

1) **Per cabinet fees charge for space, whether or not the maximum power of the cabinet is being fully drawn**. In other words, a $500 per month per cabinet charge is due whether you draw 1kW or 5 kW of power. If you only draw 1kW in that cabinet, that "space" overhead charge equates to an additional $500 per kW. So until the cabinet is drawn to its max capacity, you are overpaying for under-utilized space.

   It makes economic sense to run each cabinet to its max power density. In many cases you can do that, but what happens when you deploy higher-density server chassis and you can only fill a cabinet half way? Let's say you want to deploy 2 x 6U Cisco UCS chassis, each drawing 4kW. Because of the 5 kW cabinet limitation, you can only deploy 1 per cabinet. Which means you have to buy 2 cabinets and pay $1000 a month for the space rental, but in a higher-density facility, you would only need 1 cabinet, saving $500 per month.

   As you can see "all-in" cabinet charges can escalate rapidly when deploying power hungry equipment in low power density facilities.

2) **Paying by the power circuit means you pay for potential, not actual consumption.** You are paying a monthly fee for an entire power circuit and the potential power it can deliver. And because nobody wants to max out their circuits for fear of tripping them due to unforeseen spikes in load, companies tend to run them lower than the 80% of maximum recommendation (the de-rated value). This means you will be paying for power you will likely never consume, so your costs are immediately excessive.

In this case the customer was running most circuits in the 60-70% utilization range, not at the recommended 80%. This is very typical behavior to reduce the probability of tripping a circuit breaker. The retail colocation pricing model takes advantage of this risk aversion by requiring a fee for the whole power circuit. Unless customers are willing to increase their risk by running every single circuit at max capacity, the effective cost per drawn kW will be much higher, due to the resulting lower percentage utilization. This utilization "tax" is most noticeable when you compare the cost of managing many smaller power circuits each supplying a single server chassis with unpredictable load, versus a single larger power circuit feeding multiple chassis where the average load is more stable and the risk of tripping a breaker is sometimes less. In this scenario, multiple 20amp/ 208V circuits yielding 3.3 usable kW is less desirable than a single 60amp/ 208v/ 3-phase circuit yielding 17.3 usable kW.

CASE STUDY #2

Wholesale Colocation Advertised Price: "Only $140 per kW plus utilities!"

Customer Y, a cloud-based provider of billing software and invoice management solutions, had entered into a typical wholesale colo contract years ago and in year 5 the contract was coming up for renewal. The customer believed it was paying a very attractive rate based on the "headline" $140/kW price above and had enjoyed a flexible deployment based upon the contract terms. It negotiated a 600 kW upfront commitment with a planned ramp to 1 MW by year 3 of the term.

The pricing methodologies of wholesale contracts are typically more complicated than retail contracts, and there are a variety of billing line items incorporated into the contract, often making it hard to understand what the true cost per actual consumed kW is.

In this case, the contract had the following provisions:

- A "license fee" or monthly lease cost to access the space
- pass-through costs of the utility (ie, actual power usage charged at the utility rate)
- PUE surcharge
- cross-connect fees
- redundant power circuit fees
- common area facility fee

It is essential to understand that this contract, as in many wholesale contracts, was structured with more than 50% of the costs being unrelated to the actual power consumption. Most importantly, the lease cost, which again represents space, is independent of actual power drawn. This is because the lease also covers the cost of provisioning of standby generators, UPSs and power distribution equipment to support the customer's equipment in the event it is needed. It therefore increases with the contracted provisioned power ramp, based upon the customer's expected power draw, but remains in force and at full rate whether or not that forecasted power usage is achieved.

The second point is that the other charges, which are reflected in the contract more as fine-print, actually add up to a meaningful percentage of the overall monthly bill. The headline price ("$140 per kW plus utilities") makes no mention of these fees and they add up very quickly and significantly.

The Reality: $364 per kW

- Monthly License Fee: $140,000

Let's start with the license fee, ie, the monthly cost to lease access to the data hall capable of delivering 1 MW of power. At the initial 600 kW deployment this was set at $100,000 per month and

scaled to $140,000 per month in year 3 based on the forecasted ramp to 1 MW of power (ie, the "$140 per kW" headline number in the advertisement). In fact, the initial cost per kW was $167 per kw ($100,000 monthly fee divided by 600 kW) which immediately discredits the headline price.

It is important to note that like a monthly cabinet fee, this is a lease for space and the amount paid is independent of actual power drawn. So it again represents potential power, not actual consumed power; which has previously been shown to lead to excessive costs. Furthermore, as we will see, it alone represents nearly 60% of the monthly invoice! So the actual utility costs are relatively insignificant.

- Usage-Based Power: $102,000

Second, we added in the power costs. Pure power costs were running close to $64,000 per month (ie, straight utility pass-through costs). On top of that, the common facilities fee and PUE surcharge added another $38,000 per month.

- Other fees: $45,000

Third, we had to add in all the other various charges including redundant circuits, bandwidth and cross-connect fees.

Fully summed, the monthly invoice was $287,000. But the final, and most important, variable in understanding true cost per kW is the actual power consumption. In this case, the company was not consuming the forecasted (and contracted) 1 MW of power, but instead only 800 kW. While the company grew significantly from its original 600 kW deployment, by roughly 33%, it did not meet its expected-- and contracted-- power draw.

Taking $287,000 divided by 800 consumed kW = $358 all-in per consumed KW. This is significantly more than the advertised price of $140 per kW plus utilities.

- Leasehold Improvement Construction: $300,000

The build-out costs must be considered too. The company initially acquired white floor space, but it wasn't operational. Building out the cabinet, cabling, electrical distribution, etc. resulted in an upfront cost of approximately $300,000. While there are different methodologies to amortizing this cost, the simplest way to do this is to take the $300,000 and divide it by the contract term of 5 years, or $60,000 per year. At the initial 600 kW contract, this equated to $100 per kW, or another $8.3 per kW per month. This amount should also be added to the monthly number above to arrive at the "true" fully-amortized monthly cost per consumed kW per month. While on its face $8 per kW per month doesn't seem significant, the $300,000 sunk cost upfront was material in terms of cash flows and again, this represents another hidden tax of wholesale pricing models that often aren't accurately incorporated into effective monthly operating costs. By the end of the contract,

with only 800kW of power being consumed, the customer was paying an effective rate of $364/kW per month.

WHY WHOLESALE PRICING COSTS MORE THAN ADVERTISED

Unfortunately, this is a common experience in the wholesale colocation world. What appears to be very attractive "wholesale" rates can quickly become as, or more expensive than retail colocation rates on an all-in basis. The advertised pricing can lead you to believe otherwise, but we have reviewed dozens of wholesale contracts and invoices and consistently find wholesale contracts work out to costing somewhere between $300-450 per actual consumed kW per month. Why?

1) **Nearly 50% of the invoice is related to space, not actual power consumption:** In our wholesale case study, the space lease costs were 49% of the total costs. Again, whether 600 kW or 1 MW of power were consumed, this monthly fee was intact, representing the full 1 MW potential of the space. Unless the customer ramped and contracted power exactly as laid out, which they didn't, the contract caused the customer to pay more because the bulk of the invoice related to power potential (ie, 1 MW space), not consumption. This underutilization of capacity is a common feature of colocation deployments.

2) **IT executives do not want to get trapped by space constraints, and insure against this risk by contracting for more space/power than is necessary:** Similar to the risk aversion we discussed before in which IT execs do not want to run circuits at full capacities for fear of tripping circuits, on large wholesale deals the last thing the IT exec wants to do is end up with more growth than forecasted and be constrained by unavailable space or power. This is logical; it's hard to accurately forecast demand over a 5-10 year period and it's better to pay more and have some excess as opposed to having your datacenter limiting company growth. So why not contract for space that can support 1 MW even if your confidence level above 800 kW is not as high? You don't pay for those 200 kW of power if you don't use them, right?

   Wrong. The lease for the space, at close to 50% of the contract value, becomes very costly if/when you do not hit that targeted power draw.

3) **The "fine print" of the contract actually adds up to a significant monthly expense:** Nowhere in the headline price are PUE surcharge, common facilities fee, cross-connect fees, and bandwidth mentioned. But in aggregate these add up; in this case these fees account for $83,000 per month, or nearly 30% of the monthly bill. On an as-consumed kW basis, this is material. In fact on 800 kW consumed kW these fees alone cost the company $104 per kW per month!

Said another way, actual utilities pass-through costs only represent 22% of the monthly bill. Which means only 22% of the bill relates to actual power consumption!

PAY-AS-YOU-GO PRICING MODEL

There is a far more cost-effective and flexible pricing model that modern colocation providers may offer. In this "pay-as-you-go" approach, the customer contracts for the power it consumes and pays a simple, all-in price per kW of load drawn, including all the infrastructure necessary to deliver that power (ie, rack, power distribution, CDU, cabling, cooling, cross-connects, etc.). Each kW consumed costs the same price, so customers can scale their IT load one kW at a time, matching growth and operating costs as closely as possible.

The advantages are numerous. First, this provides for full utilization; customers only pay for what they draw. Second, this eliminates the risk in over-estimating demand many years in the future, which has a significant financial cost if the expected demand is not met. Third, it provides flexibility, with an ability to scale up and grow in very small power increments, kW by kW. Last, billing and invoicing are simple: the invoice may just include a single line item (kW consumed * price per kW)! Deciphering legacy colocation contracts which consist of dozens of pages and line item upon line item of charges and fees can be incredibly difficult to understan.

In sum, in this pricing scheme your cost per kW consumed is well known and understood upfront, and customers will avoid the often-harsh reality of legacy retail and wholesale pricing dynamics which inevitably lead to much higher costs per kW consumed than initially expected.

CONCLUSION

IT executives needing to contain operating costs and improve efficiencies should evaluate their current monthly colocation invoices. This will help them understand how much they are truly paying per kW of power consumed.

This will provide you with insight into your actual costs and more importantly provide grounds for you to propose a modified pricing scheme upon contract renewal that better fits your operating consumption. A pricing model, like Colovore's, which charges for power on an all-in basis, 1 kW at a time on a pay-as-you-go model, will match expenses as closely as possible to actual operating requirements. Paying for space and potential power inevitably leads to inefficient cost structures, but executives often pay those bills believing the initial contract terms remain applicable and attractive. Many times this is not the case!

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January 2016

About Colovore

Colovore is the Bay Area's leading provider of high-density colocation solutions. Located in Santa Clara, CA, Colovore's modern data center features wall-to-wall power densities of 20 kW per cabinet and power billed as you consume it, not based on circuit potential. This provides the most flexible, scalable, and cost-effective colocation solution in the marketplace. And with a team with decades of managing web infrastructure, not real estate, you'll be in great hands.

www.colovore.com