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White Paper:

Time for Data Centers to Consider *Time as a Service*

If you are in the data center business, you're faced with a long list of customer demands as businesses and entire industries move operations to the cloud. But you're also facing an increasingly competitive landscape where offering the best service and greatest value is paramount. Balancing what you can offer customers and at what cost can be complicated, to say the least. An often overlooked service offering, one which provides a large value to customers at a low cost to providers, is Time as a Service (TaaS).

Introduction

In today's modern distributed environments many new challenges are emerging. Among those challenges is the synchronization of applications and databases, which by nature of the cloud alone, are typically in physically disparate locations. Given the complexity of today's networks and applications, plus the pure physics of the distance between sites, trying to do things like correlate events or resolve data conflicts are virtually impossible. To solve this challenge, network architects count on a critical network element, the GPS time server, as an accurate and reliable way to synchronize their networks.

GPS time servers use the precision timing data from GPS, and other similar satellites such as GLONASS, to provide accurate time into the data center anywhere in the world. Because of this, it is an ideal solution for solving the challenges of distributed systems. Having a time server at each location allows all of the applications and data to be synchronized accurately and reliably.

This provides an ideal opportunity for hosting providers to deliver a new service that adds a lot of value; Time as a Service (TaaS). Deploying a TaaS offering is easy, inexpensive, and scalable. Depending on what kind of TaaS you deploy, it could be a free, value-added, service to customers or even provide an additional source of revenue, such as for customers who require high levels of precision. Plus, in order to host customers in certain industries, GPS-based time is essential for regulatory or compliance laws regarding the accuracy of timestamps for security and legal traceability.

So what exactly does a TaaS deployment look like? The answer really depends on the level of accuracy you want to provide. But today, most data center customers are happy with accuracy in milliseconds. For those applications, a simple NTP deployment would be more than sufficient. That would consist of one or more time servers for redundancy and a GPS antenna system. No other infrastructure is required. All standard operating systems are configured to support NTP. All you need to do is allow access to the server and provide its IP address or host name to the customer so they can connect their time clients.
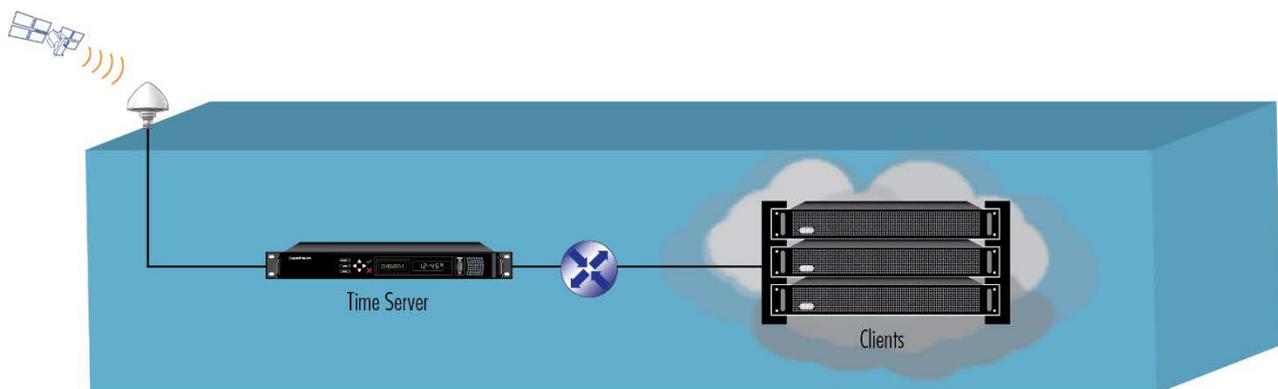

Fig. 1 A TaaS deployment is typically one or more time servers distributing GPS time across the data center infrastructure to customer time clients.

Each time server is capable of serving tens of thousands of clients or more. So given that the cost of a basic time server deployment is in the thousands of dollars, the cost per customer becomes very compelling. Especially when you consider it's a one-time investment and virtually maintenance free. What's more, timing infrastructures are getting easier to implement all the time, especially when leveraging new routing schemes like Anycast.

NTP over Anycast

Spectracom time servers include an NTP over Anycast feature to greatly simplify NTP deployments. This feature allows you to use a single, static IP address for all of your NTP clients. Behind the scenes, no matter how many time servers you have, or how often you add or remove them, that IP address doesn't change thereby making it simple to implement and maintain. And all of the time servers are pooled together so if any of them lose synchronization, then the client requests would be routed to the next nearest time server providing for high availability. This also gives you the advantage of scalability, when bringing new time servers online, since any changes that happen to the pool does not affect the NTP client IP address.
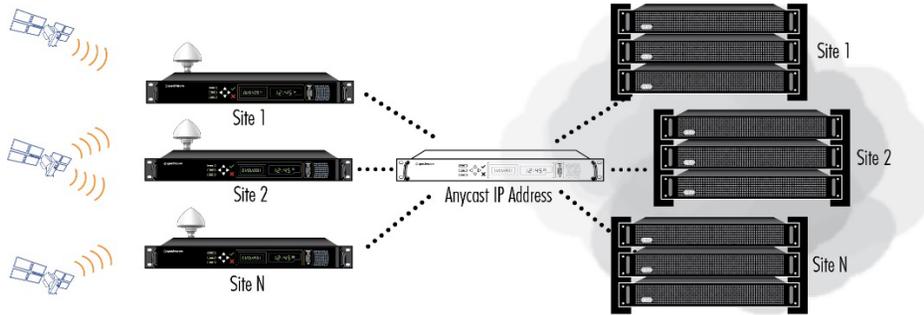
Fig. 2 The deployment of synchronization clients can be simplified via a single time server address with a dynamic configuration of time servers.

GPS Reception and Distribution

An ideal GPS time server deployment requires a rooftop antenna with clear view of the sky and RF cabling to the time server location with lightning protection where the cable enters the building. Some data centers may allow locating a roof-top GPS antenna within a few hundred feet of the time server depending on building location and layout. For others, Spectracom offers a variety of approaches to distributing the GPS signal including inline amplifiers, frequency conversion and fiber optics. Spectracom has also worked with clients to acquire GPS signal completely indoors where a roof-top GPS antenna installation is impractical.

When NTP is Not Accurate Enough

Certain applications for big data require sub-millisecond precision. Spectracom SecureSync® time servers are modular to easily add specific timing functions beyond NTP. For example, customers may request a Precision Time Protocol (PTP) service that is capable of greater network synchronization precision, or a physical timing signal such as 1 Pulse Per Second (1PPS), featuring tens of nanosecond precision. When using SecureSync as your TaaS platform, those timing outputs and others can be added with the addition of field-upgradeable option modules. This makes the SecureSync an ideal platform for hosting services where requirements are always changing.

Fig. 3 Spectracom's SecureSync® uses option modules to expand time server functionality when needed. Virtually every timing protocol and signal type is supported including PTP and 1PPS signals often required in data centers to achieve high levels of accuracy.

Conclusion

Host providers are adding services to support their customers increasing level of sophistication in cloud infrastructures. Time as a Service is simple to offer and provides benefits to data center operators and customers alike. Spectracom is in the business of improving the accessibility to synchronization technologies such as GPS, NTP, and PTP into modern enterprise computing architectures with reliability, modularity and scalability ideal for critical data center operations.