

# ISPs Can Prosper With Data Centers

Cloud services add revenue and reliability to builders of high-speed, symmetrical fiber networks.

By Steven S. Ross / *Broadband Communities*

**D**ata center technology offers even small deployers of all-fiber networks the ability to deliver gigabit service at low cost. Data centers also allow deployers to offer on-demand video, Web hosting, emergency backup and many other cloud-based services. However, talks with staff members at numerous small Internet service providers (ISPs) suggest that the potential for cloud services could far exceed what providers are doing – or even planning – today.

This is true although most providers have already entered the data center business, at least in a small way. ISPs use geographically convenient data centers as on-ramps to the Internet. Many ISPs also operate servers at their own or third-party data centers to accommodate Netflix, Google and other content providers; to serve their own video programming; to monitor their networks; and to provide such services to local businesses as hosted VoIP and data backup.

The technology and the needs are changing fast – and changing in directions that are making data centers more useful to even the smallest ISPs. The rewards to ISPs are many:

- Third-party data centers can take over network administration tasks. From Madison, Wis., INOC manages networks worldwide.
- ISPs can sell new products – everything from remote backup to video to medical and educational services.
- Small communities gain access to services

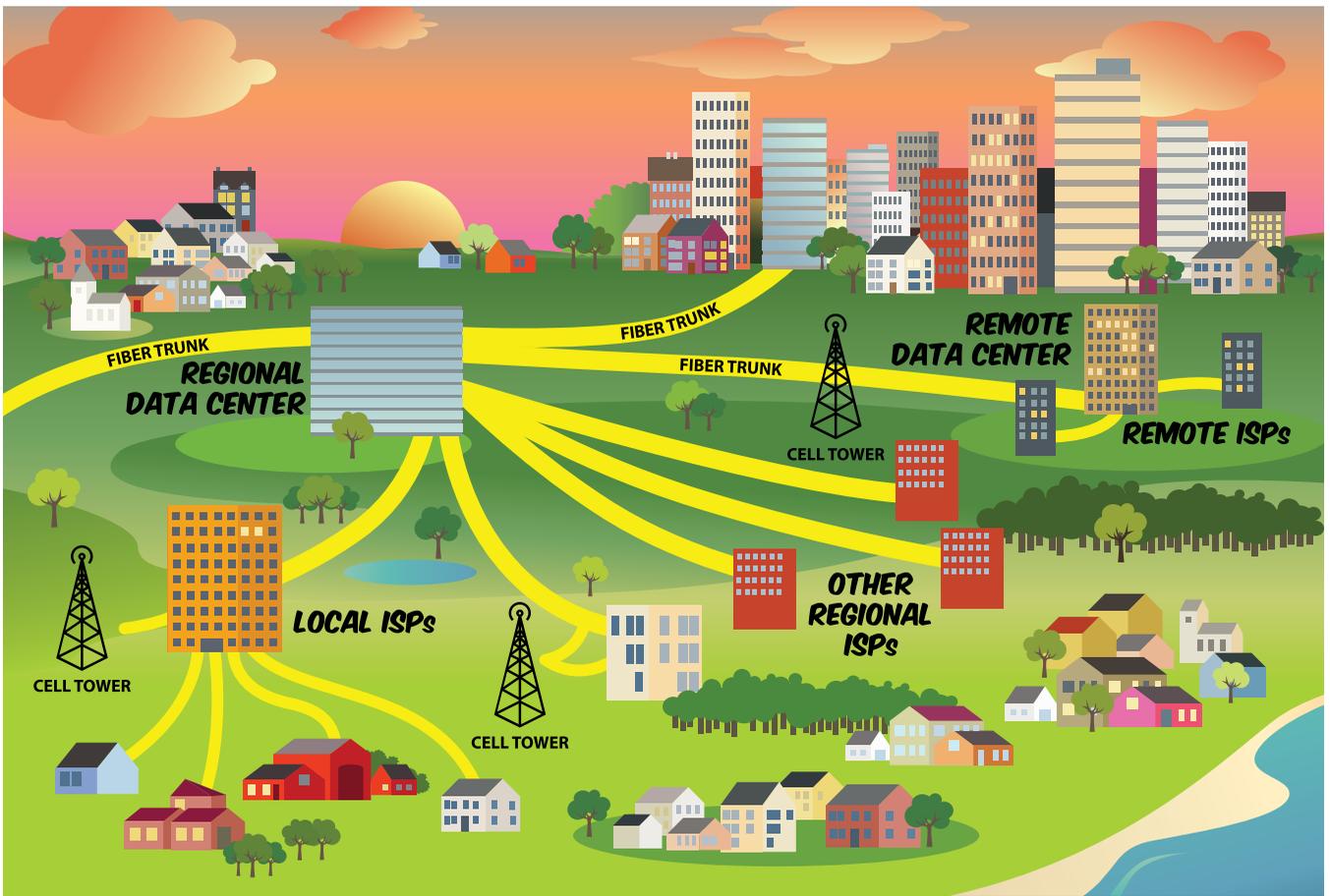


that once were available only in major cities and through major carriers.

- Small ISPs in remote locations can offer gigabit services at ever-declining prices because more of their traffic stays on-net and their transport costs decline as a result.

## CONSTRUCTION IS GETTING EASIER

Data centers require a lot less power for cooling and for running computers than they did a few decades ago. Thus, locating them near cheap coal and hydropower suppliers is no longer so important. In addition, construction is much easier than it was just a few years ago. Many vendors now offer prefabricated “package” or “modular” data centers any way customers want – from bare boxes the size of shipping containers into which others will insert equipment to full,



Synergy among ISPs, data centers, wireless carriers and long-haul carriers benefits customers.

ready-to-run centers with rack-mounted computers, emergency generators, cooling and more.

As a result, data centers accounted for a third of all IT investment in networks and network services last year – and half of that was in data centers that sold services to multiple customers.

ACI Research predicts that by 2019, business cloud computing services will increase at a 40 percent average annual rate. There will be 60 percent more data centers in the world’s metropolitan areas to handle that growth along with a tenfold increase in mobile data traffic, according to ACI. Each data center interconnect volume and computing power will increase as well, but more efficient equipment will keep energy costs down. Overall data center interconnect volumes will increase at least fourfold.

Market intelligence firm International Data Corporation (IDC) estimated that in third quarter 2014, almost a third of combined worldwide server, disk storage and Ethernet

switch infrastructure spending came from cloud deployments. Total cloud infrastructure spending for the quarter grew 16 percent year over year to \$6.5 billion. Public cloud infrastructure accounted for nearly half of total cloud infrastructure revenue and is growing even faster (18 percent year over year). Thus, spending on cloud services infrastructure alone is roughly equivalent to spending on last-mile fiber-to-the-home infrastructure.

### ANALYZING BIG DATA

Gartner predicts a 30 percent increase in network-connected devices this year. That would bring the accumulated total to nearly 5 billion “things” on the Internet, from cars to refrigerators to thermostats, cameras and more. Gartner says it is time for network deployers and providers of content and services to build business models around not just connecting the devices but also analyzing the reams of data the devices collect. Data centers should be able

to offer valuable advice to clients that range from MDU owners and managers to electricity providers and traffic police.

Pavlov Media founder Mark Scifres notes that such data, to be useful, must include data from more customers than most small networks have. His company is a major provider of video and broadband services nationwide.

Aggregating data among multiple networks could be done by data centers, by large carriers or by an emerging group of specialists that would use data center services.

### BUILD, SHARE OR OUTSOURCE?

Not all ISPs can consider building their own full-service, Tier-4 data centers (see box on next page). However, ITS Fiber, a local service provider in Florida, has done just that. Transitioning to an all-IP network allowed it to collapse its central offices and convert some of the extra space to a data center. With its all-underground fiber network, coupled with a state-of-the-art data

center, ITS Fiber now offers an ever-increasing range of data center, business applications and disaster recovery services. Its customers include far-away companies that want to locate disaster recovery sites where they won't be affected by any weather events that knock out the companies' primary sites.

Dozens of small private and municipal ISPs own or share ownership in carrier condos that connect local networks to the Internet, and many of these facilities have expanded their services by turning rooms full of customers' computers and routers into

true data centers with computers leased to a myriad of customers and used by the centers to offer backup and other services.

Another option is for an ISP to rent space and computer services from a major data center provider, such as Amazon (the industry leader), Google, Microsoft, IBM, HP, or AT&T; at the data center of an application provider whose services it is reselling; or at local data centers it uses for connections to the Internet. Allied Fiber started its fiber trunk build up the Atlantic coast in Florida with fiber configurations that

encourage establishment of local data centers.

Along with hardware and software, outsourced data centers increasingly offer specialized expertise and services that smaller organizations cannot hope to match. These include the following:

- Software-defined networks.** SDNs can use inexpensive, fast-evolving commodity hardware with ever-improving software, but the devil is in the details. The network operating systems and standards enforcement (Ethernet, GPON, IPv6 and so forth) increasingly will be distributed among all the network equipment, such as routers and switches, rather than being run from separate computers. Juniper is fairly far along in this technology, Cisco has made announcements, and HP is promising more details of what it calls "The Machine," a rethinking of computer architecture that combines CPU and memory to gain speed, energy savings and compactness – potentially reducing data centers to refrigerator-sized objects.
- Security.** Cloud systems attract cybercrime just as banks attract robbers. That's where the money is. The world is moving to an interconnected Internet of Things that will feature more reliance on electronic transaction processing; more use of big data by organizations trying to exploit wrinkles in customer demand, patterns in disease spread and efficiency of courseware; and more complex interactions between energy distribution and consumption. Successful cyberattacks could bring these activities to a standstill. There's a shortage of skilled cybersecurity personnel and a growing realization that small companies that buy ready-made security solutions are going to be vulnerable.
- Infrastructure as a service.** IaaS goes beyond mere software as a service or platform as a service (renting computer hardware together with solution stacks). A small ISP is unlikely to be able to take over and run a large company's entire computer system, but it certainly

## DATA CENTER STANDARDS

If you work at an ISP, you may be surprised to know that you are probably already running a Tier 1 data center as defined by the Telecommunications Industry Association (TIA). You might just call it the "server room." TIA is only one of many standards-setting organizations that define data centers, but its four-tier system (ANSI/TIA-942, Telecommunications Infrastructure Standard for Data Centers) is the most commonly cited. Others, including Telcordia (GR-3160-CORE, Generic Requirements for Telecommunications Data Center Equipment and Spaces), Uptime Institute's Tiers, and the Open IX Association all take their swings at it.

All the standards and recommended practices call for increasing levels of redundancy with regard to cooling, power, security and protection against location-specific natural disasters such as earthquakes, floods and hurricanes. The TIA standard is summarized as follows:

- Tier 1 requires dedicated data center space with uninterruptible power supplies and generators for equipment power and for cooling.
- Tier 2 is similar but requires redundancy for power and for cooling.
- Tier 3 adds systems that continue operating during scheduled maintenance or while upgrades are installed.
- Tier 4 data centers keep running during failures or catastrophes that damage the power and cooling systems.

The Uptime Institute adds reliability standards and other details to the TIA tiers. A Tier 1 center should be available to serve customers 99.671 percent of the time, and a Tier 4 offers at least 99.995 percent availability. That sounds close, but over a year, the differences are substantial:

Level	Expected availability	Annual downtime minutes	Annual downtime hours
Tier 1	99.671%	1729	29
Tier 2	99.741%	1361	23
Tier 3	99.982%	95	1.5
Tier 4	99.995%	26	0.5

could run the systems of private individuals and smaller companies. It could also be a sales channel for up-and-coming cloud service providers that are challenging Amazon. Those challengers range from giants such as HP, IBM and Microsoft to savvy regional data center operators. Data centers have, for instance, become the most advanced developers of software virtualization tools, which allow companies to maximize use of licensed software packages on multiple computers.

- **Managed services.** Increasingly, ISPs are handing over their network operations to experienced data center personnel. One bonus: Centralizing this function can allow small ISPs to combine and offer thousands of specialized services to residential customers, matching the telecom and cable giants.
- **Data center clustering.** There's so much information in so many

places, and it's changing so fast, that combining all the data in one place for analysis is becoming cumbersome. Thanks to fast fiber trunks, software can see and analyze data scattered worldwide as if it were all in one place.

All these services require low latency (that is, short transport time) as well as bandwidth. Thus, the advantages of renting third-party data center space are increasing despite the fact that new 100 Gbps switches have made long-distance data transport a per-byte bargain where competition exists.

#### TAIWAN GOES PUBLIC

To get a more comprehensive look at where the industry is going, I spent some time this fall in Taiwan, source of much of the hardware for data centers and, increasingly, some of the more interesting thinking about the new software environment. Taiwan's

Industrial Technology Research Institute (ITRI) has been one of the few organizations willing to talk openly about its approach, which it calls Go Cloud. Among the companies selling Go Cloud are Inventec, Wistron (WiWynn) and Delta Electronics.

Based on the idea that the network, rather than discrete computers connected to it, will run the cloud's operating system, ITRI incorporates all the key elements of IaaS, from computing, storage, networking, load balancing and security to management interfaces. ITRI sees big savings in this approach over today's approaches, which involve enormous amounts of time to integrate, test and deploy network enhancements.

It also anticipates more network stability and throughput with fewer cracks in network security because the whole system is designed to integrate smoothly, and each device in the network monitors others.

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ITRI also sees big advantages in virtual data center (VDC) administration. Until recently, operators viewed a data center as an amalgamation of resources such as storage and virtual machines (computers running multiple software packages and even operating systems at the same time; powerful data center servers can mimic 30 machines or more at once). VDC provides an abstraction layer that gives network and data center administrators the ability to provide the state and performance isolation (information on how each virtual machine is doing) for which sophisticated end users increasingly ask.

As this kind of operating system has a systemwide perspective, it can look at many factors to balance the data load, such as computing, network storage and even heat management.

Because the whole ecosystem works best when multiple networks and data centers cooperate, data center operators have a renewed interest in open source,

compatible hardware and software, mainly through the worldwide OpenStack community. Market researchers suggest that the move away from proprietary systems is now unstoppable. Standard hardware and software now accounts for more than half of all data center capital spending, IDC says.

Technology Business Research, a research and consulting firm, predicts that traditional storage vendors will use industrywide initiatives such as the Storage Management Initiative Specification, OpenStack Storage and Configuration Management Databases to introduce new features and enhancements to their platforms. Most equipment vendors offer simple white box disk arrays, routers, switches and so forth. The equipment is used with standard software, which provides the network intelligence. Thus, the network is software-defined, rather than defined by the hardware.

Standardization lowers both initial capital costs and operating expenses. It reduces the incentives private companies might have to maintain their own data centers – centers that were once custom-designed to match company needs. Now such diverse organizations as restaurant chains, banks, video distributors and retailers can share data centers. That's where network operators have a new opening – as the glue that joins local businesses and data centers.

IDC's Richard Villars puts it this way: "Cloud environments are strategic assets that organizations of all types must rely upon to quickly introduce new services of unprecedented scale, speed, and scope. Their effective use will garner first-mover advantage to any organization in a hypercompetitive market." ♦

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