**JLL**

*Data Center Solutions*
*- 7x24 Texas Chapter*

*September 2019*

# Table of Contents

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# Executive Summary

## Summary

JLL has been asked to discuss key drivers in the multi-tenant data center (MTDC) marketplace and how they might affect the decisions of users of this space.

*JLL's collective resources provide the most comprehensive and experienced data center team in the country. The Data Center Solutions team combines data center experts, capital markets professionals, and local market brokers to cover all the bases.*

## Top Scenarios Facing End Users today

- **Aging Data Center** – Older mechanical and electrical systems of user owned facilities do not match the efficiencies in which the newest MTDC's are being built and operated.

- **Virtualization and Outsourcing to the Cloud** – The vast majority of the marketplace is landing more compute and storage into the cloud leaving the existing data center highly underutilized.

- **Inflexible MTDC Contract** – The business no longer requires a 10,000 sf, 1.125MW, 10 year MTDC lease with a highly landlord favorable renewal option and little to no way to right size the space and power.

- **Need for Services / Cloud** – Users today need access to managed services, gateway to cloud, portability between any and all services not to mention access to geographic dispersion.

- **Cyber Security** – How do companies protect themselves from these threats?

# Market Dynamics and Trends

# Market Dynamics and Trends

## Market Dynamics and Trends

- Corporate clients are increasingly considering monetizing their investments in their data centers and businesses are more focused on outsourcing their IT platforms, leasing third party data center facilities, and adopting cloud services largely due to the following:

  - Rapid growth of the data center **3rd party investment market**

  - Focus on **core business** and gain access to upgraded networks, infrastructure and services

  - Eliminate overhead and **increase efficiency** in IT operations

  - Lower total **cost of ownership** (reduced exposure to significant capital maintenance), **mitigate risk** and improve **data security**

## Data Center Options

- Potential structures:
  - Build-to-Own
  - Build-to-Lease
  - Refurbish/Retrofit existing
  - Colocation
  - Full Outsourcing to Integrator
  - Cloud (Public/Private/Hybrid)
  - Managed Services
  - Combination of Many

## Wholesale MTDC Provider Build Cost/kw

| Market | Tier 2 DC | Tier 3 DC | Tier 4 DC |
|--------|-----------|-----------|-----------|
| DFW | $5,000 | $6,000 | $7,500 |
| Chicago | $6,000 | $7,000 | $8,500 |
| NoCal | $7,000 | $8,000 | $9,000 |

## Trends to Watch in 2019

- **Scale** will become more important: many operators desire locations in multiple, edge geographies

- The **Internet** of things: providers will need to look to smaller, tertiary markets as new opportunities for expansion

- High costs will continue to influence **locational decisions**: balance demand for space and power with growing construction, tax and electricity costs

- **Disaster recovery**: regulatory measures will require DCs to be located certain distances from HQs, opening up secondary/tertiary markets

- **Security and quality** control: increasing M&A activity and geographical expansion will require strict control

- **Outsourcing and offshoring**: companies continue to shed cumbersome and expensive IT activities to industry experts

- **Companies are establishing global nodes** to access the cloud

- **Markets to watch**: Northern VA, Phoenix, DFW, Singapore, Frankfurt and Edge markets

# Market Overview

# Market Overview

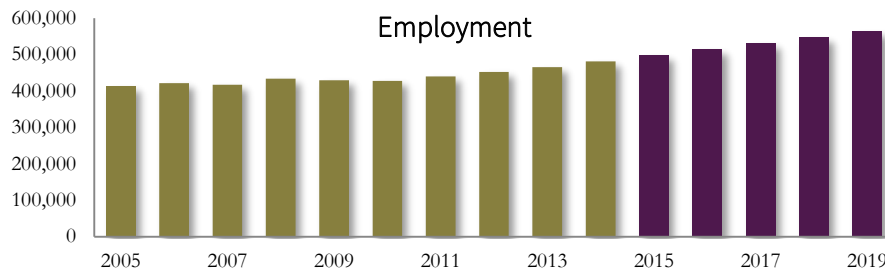## National Data Center Markets Overview

### Economic Picture

Over the last five years, two dynamics have propelled growth in the data center industry:

- Businesses outsourcing their IT infrastructure needs
- Popularization of cloud computing

*In response to these trends, the global multi-tenant data center market is expected to rise at CAGR of 12.1 percent between 2015 and 2018. North America represents approximately 44% of the global data center market.*

**Employment**

| Year | Employment |
|------|-----------|
| 2005 | ~415,000 |
| 2006 | ~420,000 |
| 2007 | ~415,000 |
| 2008 | ~430,000 |
| 2009 | ~425,000 |
| 2010 | ~425,000 |
| 2011 | ~440,000 |
| 2012 | ~450,000 |
| 2013 | ~465,000 |
| 2014 | ~480,000 |
| 2015 | ~495,000 |
| 2016 | ~515,000 |
| 2017 | ~530,000 |
| 2018 | ~545,000 |
| 2019 | ~560,000 |

### Demand Drivers

- Mitigate capital expenditures
- Eliminate resource intensive maintenance responsibilities
- Lower facility operating expenses
- Accommodate rapid changes in data and equipment needs
- Gain flexible power densities
- Access deeper technical expertise and innovations
- Free up IT resources to focus on value generating business initiatives

### Supply Drivers

- Where by third party providers were once spinning off assets into REIT's and/or going public, we are seeing a trend of returning to private or public/private JV's
- Emergence of hybrid offerings and new services range from colocation hosting to complete turnkey or custom spaces

### Insight

*Tier 1 data center market must-haves:*
- ✓ Low cost electricity
- ✓ Enormous bandwidth
- ✓ Lower operating costs
- ✓ Fiber availability
- ✓ Low natural disaster risk
- ✓ Accessibility by car & air
- ✓ Attractive government incentives

- ✓ Tenants control the leverage
- ✓ Providers offering deep discounts, concessions, and TI's to compete
- ✓ By late 2019, vast amounts of supply in major markets have slowed development
- ✓ Demand drivers fueling lease expansions

# Market Overview

## Capital Markets Data Center Overview

- The Data Center **Investment Market is very active**, with public and private REIT's, institutional investors, sovereign wealth funds and boutique investors all recognizing and growing their portfolios in this evolving asset class (ie **Digital Realty** $1.4B Data Center Deal with Singapore Mapletree, 80/20 JV on 3 HyperScale & 10PBBs)

- **Capital** for investment in technical/data center real estate is substantial. Due to the heavy competition in Retail, Industrial and Office real estate categories, new money is being deployed into the growing data center sector to capture better returns for investors (ie **Colony Capital** selling off 90% of its $20B portfolio to go digital)

- **Cap Rates** are continually being driven down on acquisitions of this asset class, as **Public and Private REIT's** and real estate investors that specialize in this niche market dominate total investment.

- **High credit, long term leases** in quality technical/data center real estate attract additional investors outside specialized buyers, and drive some of the lowest cap rates in the industry.

- **Supply of opportunities are limited**, especially those that provide a quick "time to market" deployment strategy.

  - Multi-Tenant Data Centers Providers are expanding their global footprint so they can deliver product quickly in order to capture growing demand, and check as many boxes for Fortune 500 companies 'stamp of approval' when evaluating opportunities.

  - Enterprise Users that subscribe to the own and operate model are at times up against a quick timeline due to a consolidation project, retirement of an existing facility, failure of an existing facility, or a pressing business unit need.

- **Demand** for data center space is being met with healthy supply, particularly in the **top U.S. data center markets** such as Northern California, DFW, Northern Virginia, and Chicago.

- Existing Newly formed data center **REITs** are fearlessly competing to **build their portfolios**, particularly in global markets with **best-in-class enterprise grade facilities**. REIT investors are requiring them to establish a platform that can cover the globe (not just the U.S.!).

# Market Overview

## DFW Data Center Market Overview

- **Supply** in Dallas/Fort Worth ("DFW") continues to be robust, with providers/enterprises completing shell construction on new builds in Q1-Q2. Stream is under construction in Garland and Equinix has begun Phase 1 of a new, four-story 40MW build at INFOMART. Google has broken ground on its campus in nearby Midlothian and Facebook has finished its last building in Fort Worth.

- Though enterprise **Demand** continues to dominate in DFW, large social media players have been quietly absorbing space in the market at scale. Organic growth from existing customer base expansions remains a consistent driver of absorption in the market.

- **Market Trends –** As providers, such as Stream, QTS, CyrusOne and Digital Realty, complete construction on their latest builds, supply in the market remains well positioned to meet user demand. Absorption by traditional enterprises and major social media players in the market signals opportunity for providers.

*Average MTDC Rental Rates:*

*$95-$115/kw*

*Average MTDC Size:*
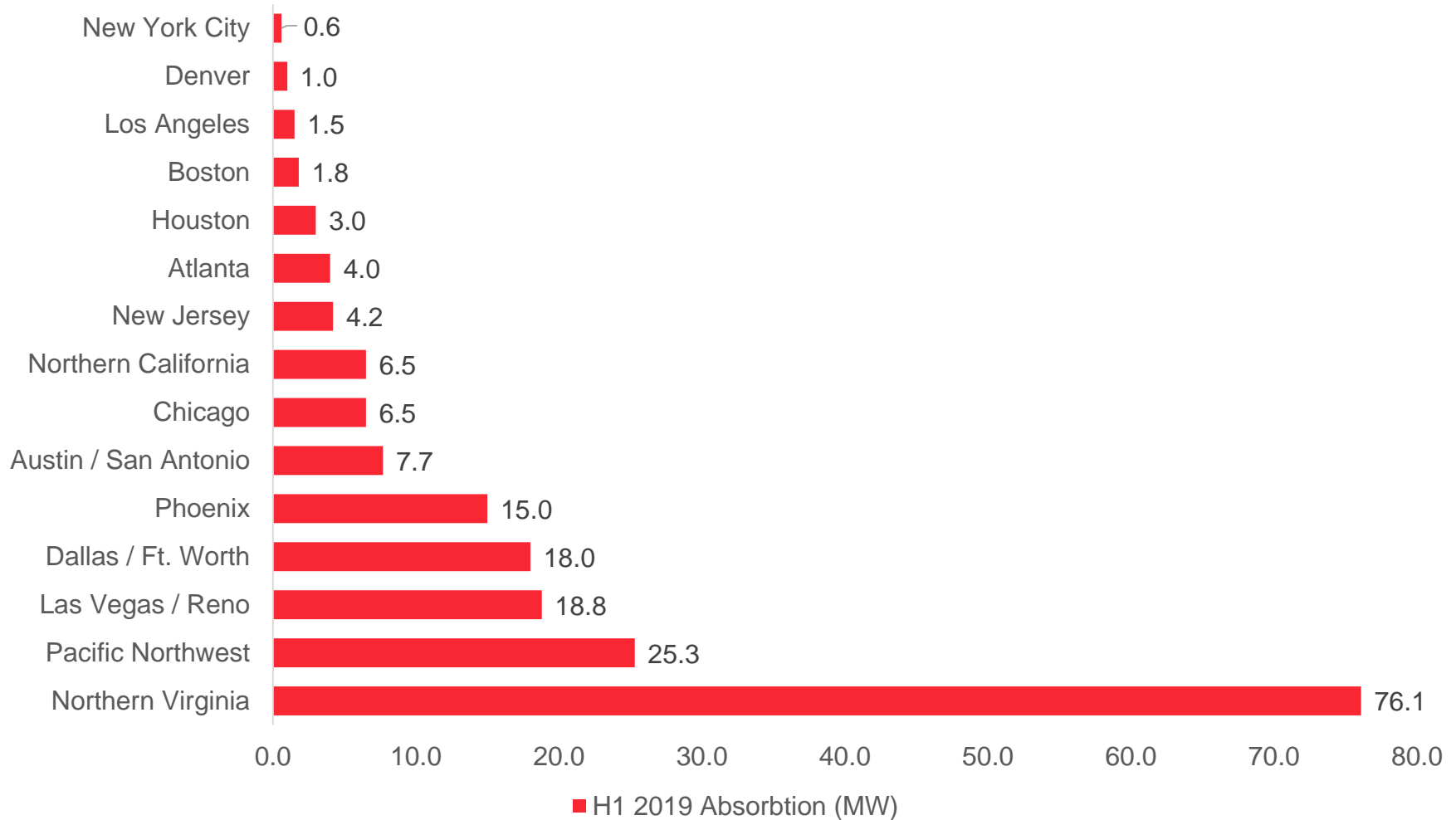
*~500/kw (less CSP's)*

*Average MTDC Term:*

*5 years*

*Range MTDC PUE:*

*1.15 – 1.6*

# Trends

*1*
**After a rough year in 2018, data center REITS bounce back to start 2019**
Following strong returns and positive sentiment in 2016 and 2017, data center REITs delivered considerable losses in 2018. The five U.S.-based data center REITs – Digital Realty Trust, Equinix, CoreSite Realty Trust, CyrusOne and QTS Realty Trust – averaged -**14.1 percent in returns in 2018.**

The tide changed for REITs in H1 2019. As of July 17, year-to-date total returns for the five U.S.-based REITs is **29 percent**.

*2*
**Incoming demand for more edge locations brings construction considerations**
Data consumption is exponentially growing and **requires data centers to be closer to the consumer**, resulting in more edge locations that improve latency. From Tinder swipes to Netflix bingeing, data consumption required data center operators to step up to **increase speed, security and efficiency**.

*3*
**New locations and innovations spur recycling opportunity**
As a result of new efficiencies, the cycling of servers and other equipment is bubbling. Global spend on data center **hardware and software rose by 17.0 percent in 2019.** This growing recycling and decommissioning process creates an opportunity for companies to step in and take care of the needs of data center users.

# Absorption *(MW by Market, H1 2019)*



| Market | H1 2019 Absorption (MW) |
|---|---|
| New York City | 0.6 |
| Denver | 1.0 |
| Los Angeles | 1.5 |
| Boston | 1.8 |
| Houston | 3.0 |
| Atlanta | 4.0 |
| New Jersey | 4.2 |
| Northern California | 6.5 |
| Chicago | 6.5 |
| Austin / San Antonio | 7.7 |
| Phoenix | 15.0 |
| Dallas / Ft. Worth | 18.0 |
| Las Vegas / Reno | 18.8 |
| Pacific Northwest | 25.3 |
| Northern Virginia | 76.1 |

■ H1 2019 Absorbtion (MW)

# Texas Snapshot

# Supply / Demand / Rental Rates

## Austin / San Antonio

**Supply**

Total inventory: 775,883 s.f. / 142.2 MW

Total vacant: 36,073 s.f. / 8.5 MW

Under construction: 2,750 / 0.5 MW

Planned: 125,146 s.f. / 18.0 MW

**Demand**

Net absorption YTD: 7.7 MW

**Rental rates**

< 250 kW: $220 - $290/kW (all in)

> 250 kW: $100 - $120/kW (+E)

## Dallas / Fort Worth

**Supply**

Total inventory: 3,709,649 s.f. / 527.4 MW

Total vacant: 601,687 s.f. / 84.0 MW

Under construction: 117,000 s.f. / 24.2 MW

Planned: 1,193,894 s.f. / 212.7 MW

**Demand**

Net absorption YTD: 18.0 MW

**Rental rates**

< 250 kW: $190 - $300/kW (all in)

> 250 kW: $95 - $115/kW (+E)

## Houston

**Supply**

Total inventory: 1,105,411 s.f. / 142.47MW

Total vacant: 211,385 s.f. / 20.4 MW

Under construction: - / 0.0 MW
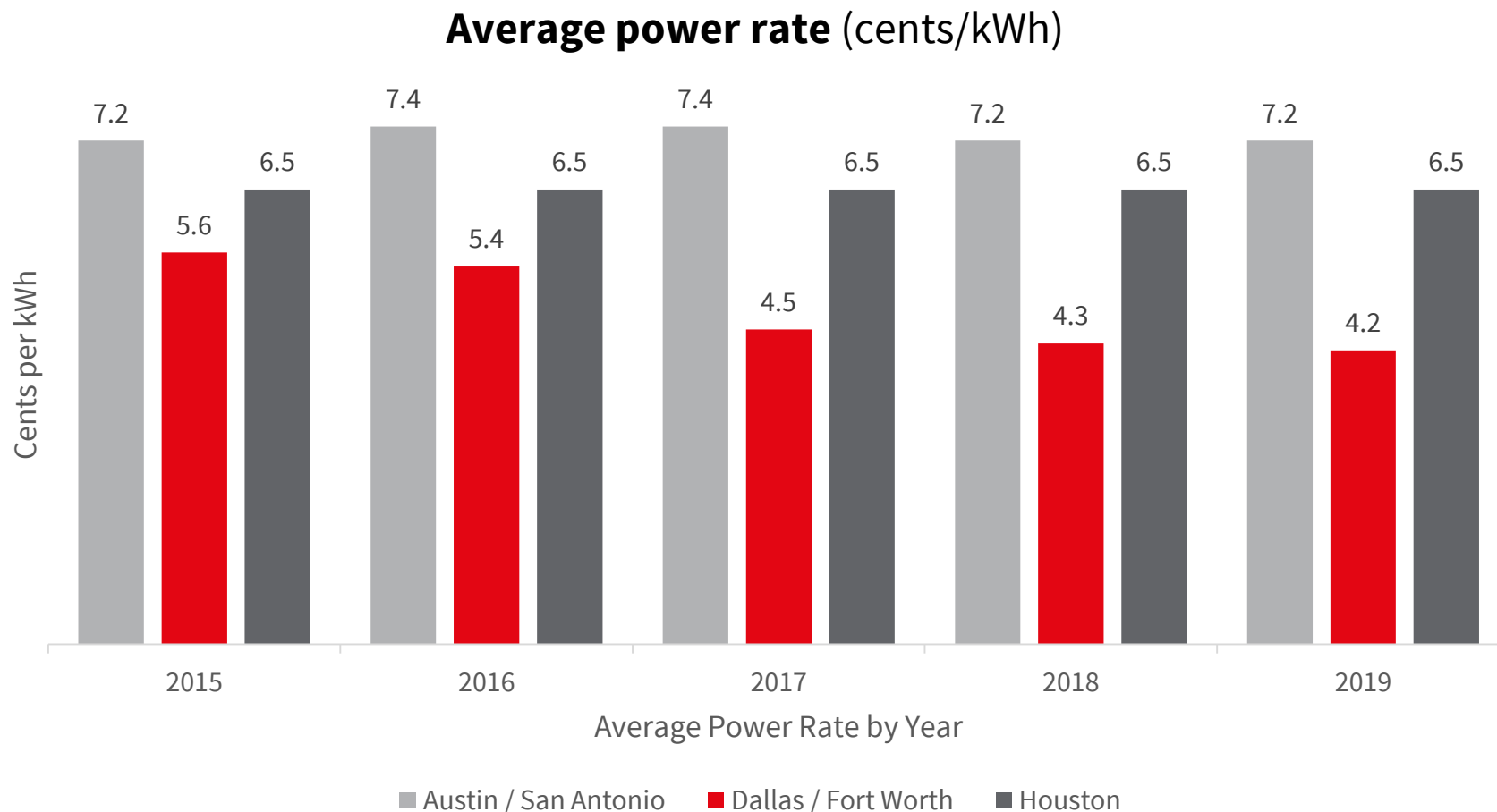
Planned: 582,413 s.f. / 82.4 MW
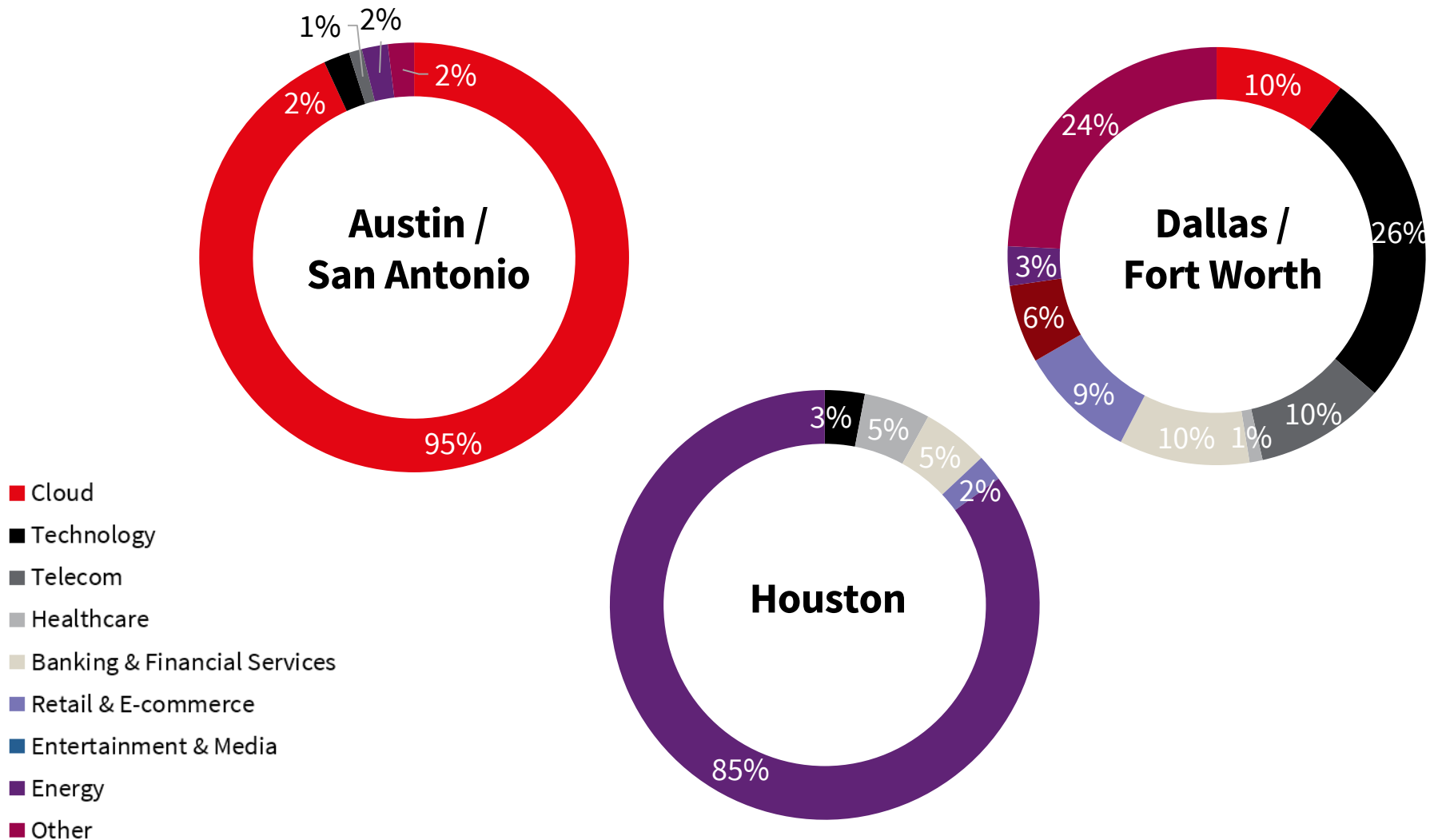
**Demand**

Net absorption YTD: 3.0 MW

**Rental rates**

< 250 kW: $220 - $290/kW (all in)

> 250 kW: $95 - $120/kW (+E)

# Average Power Rates

**Average power rate** (cents/kWh)



Cents per kWh

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Austin / San Antonio | 7.2 | 7.4 | 7.4 | 7.2 | 7.2 |
| Dallas / Fort Worth | 5.6 | 5.4 | 4.5 | 4.3 | 4.2 |
| Houston | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |

Average Power Rate by Year

■ Austin / San Antonio   ■ Dallas / Fort Worth   ■ Houston

# User Demand by Industry



Austin / San Antonio

Dallas / Fort Worth

Houston

Legend:
- Cloud
- Technology
- Telecom
- Healthcare
- Banking & Financial Services
- Retail & E-commerce
- Entertainment & Media
- Energy
- Other

DFW Data Center Solutions Team

# Data Center Team

## Current Responsibilities

Bo is Managing Director and Co-Leader of JLL's global Data Center Solutions practice team. He is a recognized leader in the real estate industry whose knowledge of technical issues, infrastructure, connectivity and IT assessment has allowed him to develop the unique skills required for mission critical requirements. He works with clients to develop the necessary strategies to meet their individual objectives including tenant and owner representation, investment sales and acquisitions, leasing and development of these unique assets.

## Experience

Bo has over 25 years of experience in the commercial real estate industry.  He was with The Staubach Company for ten years, and became a member of the JLL team when they merged with Staubach in July 2008. Bo has successfully negotiated over 20 million square feet of real estate transactions in multiple states. Bo has been recognized numerous times for achievement during his career.  Some of his notable awards are, Dallas Business Journal's "Heavy Hitters" List (Years 1999 – '14), Staubach/JLL "Top Gun" (2007-09, 2011-17),  and "Top Achiever"  (Years 1999-'19). The Dallas Business Journal "Best Deals" (Fleming '00, VHA '02, AAA '03, Cisco '09, RagingWire '15), Top Broker listed in DCEO (2009, 2011 – '18), and the 2009 - 2018 Power Broker listed in Costar.

## Education and Affiliations

Bo earned a bachelor of business administration degree in marketing/sales (cum laude) from the University of Mississippi.

Bo is a member of Highland Park United Methodist Church, North Texas Commercial Association of Realtors (NTCAR), 7x24 Exchange,  AFCOM and CoreNet Global.  Bo is recognized nationally as a data center industry expert and speaks multiple times a year at data center conferences. He is married with three boys and enjoys coaching all his children's sports

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# Data Center Team

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## Current Responsibilities

Curt is an Executive Vice President with JLL's global Data Center Solutions practice team. He has over 23 years' experience in the commercial real estate industry, including nine years' experience in the technology industry. Curt has become a recognized leader in the technical real estate industry. He focuses on all facets of this niche segment of commercial real estate including user representation, investment sales, project leasing and development.

## Experience

Curt has experience working in multiple markets around the country assisting users, owners and investors evaluate their critical facility assets and devise the proper strategy to maximize their investment. This experience encompasses work in over 60 markets in 30 different states and includes several data center and critical facility asset sales and dispositions. During the last five years, Curt has transacted over 3 million square feet of data centers in multiple markets around the United States. Curt's clients include JP Morgan Chase, PricewaterhouseCoopers, KPMG, Amazon, Inc., Computer Science Corporation (CSC), SAIC, Inc., Cyrus One, Bed, Bath & Beyond, Kaiser Permanente, Vanguard, Toyota, Xerox, Verizon, and ViaWest among others.

## Education and Affiliations

Curt received a Bachelor of Arts degree from the University of Texas at Austin and is a licensed salesperson in the state of Texas.

# Data Center Team

**Ali Greenwood**
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## Current Responsibilities

Ali is a Senior Vice President with JLL's global Data Center Solutions team. She has over eleven years of experience in the data center, commercial real estate, private investment, technology and REIT industries. She focuses on developing and executing for clients a full range of data center services, including strategy development & execution, site/provider selection, agreement negotiations, TCO analysis, portfolio and asset valuation, dispositions, DR & hybrid IT/cloud deployments. She has strong financial skills when evaluating various types of scenarios from valuation of portfolios, underwriting dispositions, greenfield and upgrades, colocation lease transactions, and hybrid scenarios.

## Experience

Ali was previously with Digital Realty (DLR), as part of the global sales organization, as well as their portfolio management team for the Central U.S. region, with a technical real estate portfolio of assets valued at over $818M (3.2M square feet) involving significant data center development and leasing activity.

Ali has been recognized numerous times for achievement during her career, including Young Leader of the Year Finalist – Women in IT Awards (2018), Dallas Business Journal "Best Deals" (RagingWire 2015 and Stream 2017) and Top Broker listed in DCEO (2014 – 2018)

## Education and Affiliations

Ali graduated from Baylor University with a BBA in Real Estate Finance & Marketing. She is a licensed Texas real estate salesperson.

Ali serves on the Clayton Dabney For Kids With Cancer Board of Directors and is a member of Highland Park United Methodist Church, where she serves on the Outreach Committee. Ali is recognized nationally as a data center industry expert and speaks often at data center conferences. She is married and enjoys spending time with her young family.

Appendix

# Appendix

## Definitions

- **Data Center (DC):** facility that houses IT equipment used to process, communicate, and store data for all our digital activities

- **Raised Floor (RF):** provides an elevated structural floor to create a hidden void for the passage of mechanical and electrical services; isolated air-conditioning zones are often associated with raised floors

- **UPS (uninterruptable power supply):** provides emergency power to a load when the input power source fails

- **Critical Power Load (critical load):** the usable electrical capacity at the DC floor and server cord; does not include any ancillary load for cooling, lighting, common areas or other equipment

- **Redundancy:** duplication of critical components or functions of a system with the intention of increasing reliability of the system, usually in the form of a backup or fail-safe; needs (N) plus how many additional (redundant) paths (#)

  - **N+1:** if load can be supplied by N modules, installation will contain N+1 modules (ex: if 3 feeds, N+1 means need 2, but have 3)

  - **2N:** each power supply connected to its own UPS (ex: if 3 feeds, 2N means need 3, but have 6)

- **PUE (power utilization efficiency):** measures how effective the DC is in using the input power; ratio of power available to power used, the larger the number the less efficient the DC utilization is

  - Ex: PUE is 1.2 if DC had 1 on RF, but need 1.2 for entire building

- **PDU (power distribution unit):** device fitted with multiple outputs designed to distribute electric power, especially to racks of computers and networking equipment within a DC

- **CRAC (computer room AC) / CRAH (computer room air handler):** provide cooling to RF

- **Portability** – Ability to port monies spent by users at the MTDC between services, cloud or location.

## Definitions *(cont'd)*

- **MMR (meet me room):** space in a colocation DC or carrier hotel that allows communications firms to exchange data with hundreds of other major telecom carriers and Internet service providers housed within the same facility and avoid local loop fees

  - Customers include Regional Bell Operating Companies (RBOCs), such as Ameritech, BellSouth, and SBC

- **Colocation:** provide space, power, cooling, and physical security for the server, storage, and networking equipment of other firms—and connect them to a variety of telecommunications and network service providers—with minimum cost and complexity

  - **Retail Colocation:** customer leases space within a DC, usually a rack, space within a rack, or a caged-off area (ex: Cologix, Equinix, InterNap, Datapipe)

  - **Wholesale Colocation:** tenant leases fully-built DC space (white space) and is often responsible for handling all IT operations in that space (ex: RagingWire, Digital Realty, QTS, CyrusOne)

- **Carrier Hotel:** colocation data center more focused on connectivity and interconnection

- **Enterprise:** in-house data center, typical for larger organizations and those in the technology industry that design, build and operate their own facilities

- **Telco:** Most telecommunications firms control a substantial portfolio of technical real estate housing critical network equipment. The buildings are generally older vintage than most modern data centers but are built to similar standards with respect to building design and construction. These facilities operate at highly redundant levels across the spectrum of power and infrastructure, but typically deliver lower power density (+/- 50 watts per SF) than modern data centers. Equipment within the critical environment relates to switching, transport and interconnection rather than servers hosting data and applications. As such, these facilities often utilize more DC power than the AC power that is resident in most data centers.

## Definitions *(cont'd)*

- **Edge:** These are facilities that extend the "edge" of the internet further from the traditional tier-1 internet hubs to tier-2 cities, such as Phoenix, Minneapolis and St. Paul. Historically, the internet's "edge" had been limited to tier-1 cities, such as New York, Chicago and Los Angeles, however, the explosion of the cloud and internet-based content has created the need to move the "edge," closer to where the users are.

- **Hub:** big core market data centers, where all the players in the long chain of delivering content or services to customers interconnect and exchange traffic; where most of the internet has lived and grown for the bulk of its existence

- **Powered Base Building (PBB):** undeveloped space with the power and fiber connectivity already in place; allows for easy expansion for companies with the capital to build the data center infrastructure themselves

- **Turn-key:** offers customers finished "plug and play" raised floor data center space, which shifts the data center development costs from the tenant to the landlord, and allows for much quicker deployment than if the customer built a new facility on its own

- **Wholesale Colocation:** historically 1MW and up

  - **Landlord:** provides fiber connectivity, conditioned power, environmental controls and facility-level maintenance;

  - **Tenant:** installs and maintains all power distribution, networking distribution, racks and IT gear; fiber access may be direct or through MMR

- **Retail Colocation:** smaller power and space needs, typically ~300kW

  - **Landlord:** provides fiber connectivity (may provide networking/internet access), conditioned power at server-usable levels, environmental controls, cage (usually racks) and all maintenance

  - **Tenant:** installs and maintains IT gear

# Appendix

## Definitions *(cont'd)*

- Tier 1

  - Single non-redundant distribution path serving the IT equipment
  - Non-redundant capacity components
  - Basic site infrastructure with expected availability of 99.671%

- Tier 2

  - Meets or exceeds all Tier 1 requirements
  - Redundant site infrastructure capacity components with expected availability of 99.741%

- Tier 3

  - Meets or exceeds all Tier 2 requirements
  - Multiple independent distribution paths serving the IT equipment
  - All IT equipment must be dual-powered and fully compatible with the topology of a site's architecture
  - Concurrently maintainable site infrastructure with expected availability of 99.982%

- Tier 4

  - Meets or exceeds all Tier 3 requirements
  - All cooling equipment is independently dual-powered, including chillers and heating, ventilating and air-conditioning (HVAC) systems
  - Fault-tolerant site infrastructure with electrical power storage and distribution facilities with expected availability of 99.995%

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**JLL** | *Achieve Ambitions*

About JLL Data Center Solutions: JLL's Global Data Center Solutions team has delivered customized data center services and strategies to many of the world's largest corporations. With the expertise of having managed 1110 megawatts of critical facilities transactions, our team assist companies with total site selection(from greenfield to colocation to cloud) utilizing best in class due diligence, in-depth TCO analysis and comparisons, risk and infrastructure assessments, project development services, migration consulting, contract and SLA negotiations and budget preparations. Our Capital Markets group has deep experience in the data center industry from investment property sales to debt financing and our critical facilities management team oversees 92 million square feet of critical environments. We understand the technical elements that are crucial to your facility in terms of power, cooling, fiber, latency, utilities, redundancy, taxes, construction, public incentives and security. JLL's Data Center Solutions team will help you determine the best IT and data center strategy to meet your business objectives.