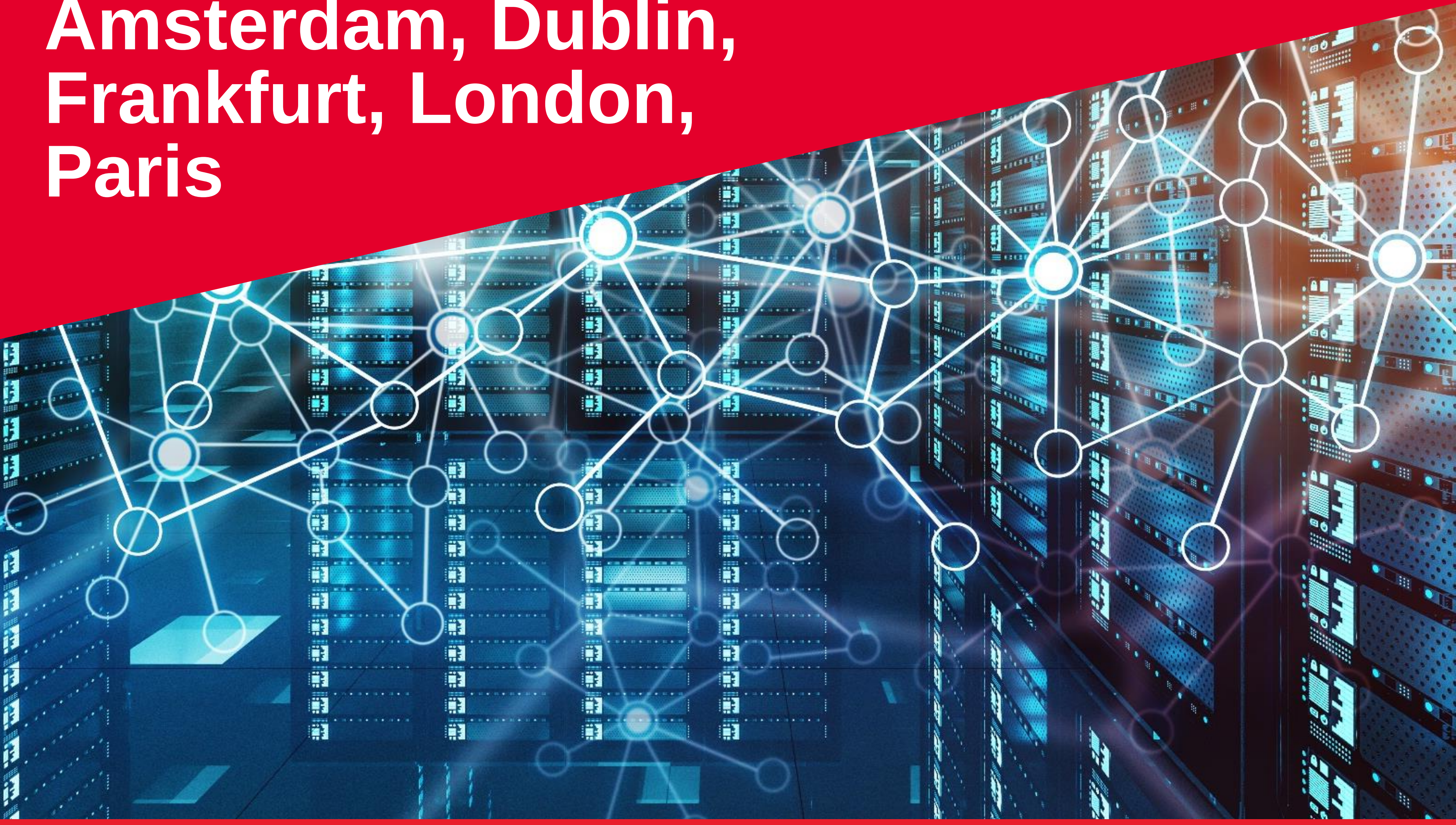
CUSHMAN & WAKEFIELD

DATA CENTRE UPDATE

EMEA:

Amsterdam, Dublin, Frankfurt, London, Paris



DATA CENTRE UPDATE

AMSTERDAM

SUMMER 2021

Key Indicators

Under Construction
26 MW

Vacancy
11%

Market Overview

As concern continues surrounding the ability of the Amsterdam power grid to support new large-scale builds, work continues on determining proper environmental targets for power usage effectiveness (PUE) and other metrics for the local industry between government and operators across the region. A construction limit of 67 MVA has been mooted, which would allow for development in small phases as currently occurring with major operators such as Iron Mountain, Global Switch, Switch Datacentres, and Digital Realty. Demand remains strong for any available large-scale capacity locally, with occupants drawn by the robust connectivity and array of cloud onramps available. Overall market vacancy is somewhat deceptive at 11%, with most of this found in smaller amounts across the city rather than in available large halls. Amsterdam serves as a hub for the development of further technical efficiencies in the data centre environment, from the reuse of waste heat to water cooling.

Digital Realty led the investment market in recent months, electing to recycle older assets as they continue on new construction. Three buildings moved to Ascendas REIT ownership, part of a larger pan-European portfolio of assets. With new development likely to remain scarce for some time, acquisition of operating facilities will remain exceptionally attractive for new market entrants. Cautious optimism continues for Amsterdam, with the industry highly interested in new developments both physical and political.

Ecosystem Developments

- **NorthC** agreed to a new partnership with Megaport at the end of 2020, with the platform now available from the NorthC data centre in Oude Meer. The Megaport point-of-presence (PoP) will allow for quicker connectivity across the leading cloud services. NorthC has also initiated a district heating system for their data centre in Aalsmeer, reusing data centre waste water heat to warm a nearby school, swimming pool, sports hall, and nursery. The water is then transported back to the facility for further cooling.

- **DCspine** is now available at the local maincubes data centre, with the interconnection platform providing a variety of network options and greater capacity. DCspine is now available at over 75 data centres across the Netherlands and Belgium.

- **G-Core Labs** has added a new PoP in Amsterdam, the sixth public cloud location globally for the managed services provider. G-Core offers users a variety of artificial intelligence (AI), virtual cloud networks, and much else with fast scalability.

- **iland** announced a new disaster recovery client in Amsterdam, with Amsterdam Ambulance signing on early in the year. The ambulance company serves a variety of institutions in greater Amsterdam, and was attracted by the existing iland-Veeam cloud relationship.

- **Cyxtera** added Amsterdam and Frankfurt as markets offering their bare metal service, bringing to 12 the number of locations globally. The operator is marketing the service as an option for enterprises creating a scalable hybrid environment.

MORE INFORMATION

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DATA CENTRE UPDATE

AMSTERDAM

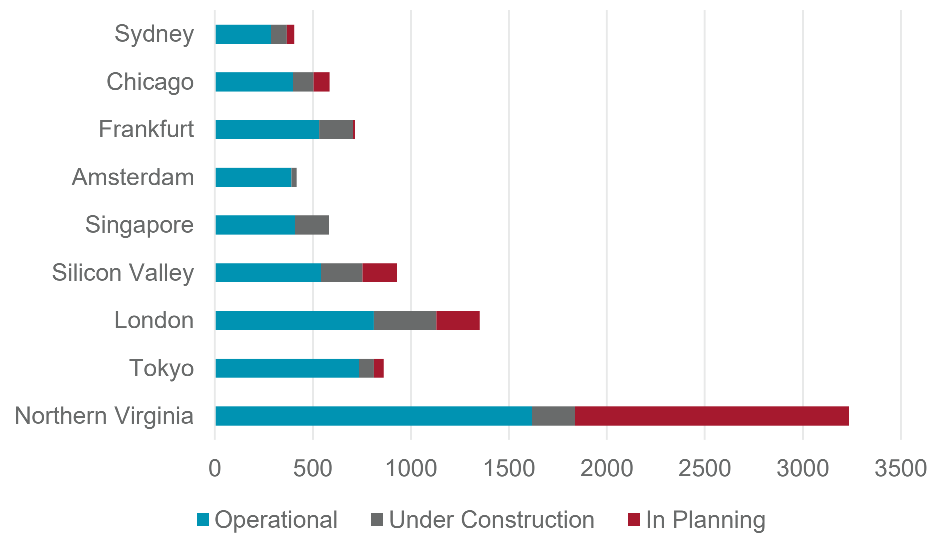
SUMMER 2021

CUSHMAN & WAKEFIELD

Ecosystem Developments

- **Zayo** has added Ciena Wavelogic 5 Extreme technology on their network connecting Amsterdam and Dublin, adding further capacity and overall performance along the route.
- **EdgeConneX** announced the deployment of Cloudflare Network Interconnect in an initial 16 markets nationwide, with Amsterdam, Atlanta, and Miami joining shortly. The option will offer additional network protection to current customers and will help speed traffic and peering.

Market Capacity (MW)



Global Market Leadership

As shown on the chart to the right, many of the largest markets globally continue to add capacity both active and in planning. Northern Virginia (the original one gigawatt market) will soon be double the current size, with London soon following past the one gigawatt size. Markets such as Amsterdam and Singapore that have slowed development of late are now rapidly being surpassed, as areas with less constrictions scale accordingly.

Construction Update

OPERATOR	LOCATION	SIZE (SQM)	POWER (MW)	STAGE / EST. DELIVERY
Iron Mountain	AMS-1 Phase 3 AMS-1 Phase 4	1,254 6,271	1.1 5	Under Construction / Q2 2021 Under Construction / Q1 2022
Global Switch	Amsterdam East	32,000	6	Under Construction / Q4 2021
Switch	AMS4	7,000 (est)	7	Under Construction / Q4 2021
Digital Realty	Amsterdam (2 buildings)	8,800	6.4	Under Construction / Q1 2022

Recent Property Sales

PROPERTY	SIZE (SQM)	SALE DATE	SALE PRICE	BUYER	SELLER
Three Assets (Amsterdam and Schiphol)	17,095	Mar-21	€145,000,000	Ascendas REIT	Digital Realty
Naritaweg 52, Amsterdam	5,853	Dec-20	€5,500,000	Egeria	Digital Realty

DATA CENTRE UPDATE
DUBLIN
SUMMER 2021

Key Indicators

Under Construction
189 MW

Vacancy
3%

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Market Overview

A very recent report issued by the Commission for Regulation of Utilities (CRU) proposed that EirGrid and ESB Networks prioritize data centre power requests by location, flexibility of need, and the ability to generate on-site power; something to keep in mind with an additional 2 GW of power requests already received! As power continues to a concern for large-scale builds, creativity and renewable supply will be a stronger decision point going forward. Dublin (and Ireland as a whole) has thrived of late, with available capacity dropping to 3% within the market and nearly 200 MW under construction. Several large builds are in serious planning, with hyperscalers particularly eager to move new capacity along as soon as possible. The recent expansion announcement by the Equinix and GIC xScale joint venture suggests that three further large campuses will be coming in the next several years, potentially putting further pressure on the grid. The CRU will be consulting with industry bodies going forward, with commentary on the release to be reviewed shortly. It would appear that Dublin's success comes with its own challenges as the red-hot market pushes ahead.

Ecosystem Developments

- **Echelon Data Centres** has agreed to a relationship with Biocore Environmental, with plans to produce biogas at their upcoming DUB20 campus. The methane gas will be produced via organic waste and provide fuel for backup generators onsite.
- **Quanta Capital** recently acquired an 82-acre site in Kilpedder, previously approved for a data centre campus. Specific plans have yet to be announced, but permission had been granted for 700,000 square feet of data centre space.
- **Zayo** has added Ciena Wavelogic 5 Extreme technology on their network connecting Amsterdam and Dublin, adding further capacity and overall performance along the route.
- **Digital Realty** is now offering Amazon Web Services Direct Connect 100 Gbps access at Interxion Dublin, providing lower latency and ease of use for the largest data sets.

Construction Update

OPERATOR	LOCATION	SIZE (SQM)	POWER (MW)	STAGE / EST. DELIVERY
CyrusOne	South Dublin	18,952	12	Under Construction / Q2 2021
Amazon	Mulhuddart Tallaght Clonshaugh	20,717 23,283 33,352	35 30 (est) 40 (est)	Under Construction / Q2 2021 In Planning In Planning
Digital Realty	Dublin	8,733	6	Under Construction / Q3 2021
Echelon	DUB10 DUB20 DUB30 DUB40	60,758 45,000 22,210 50,000 (est)	3 20 100 20	Under Construction / Q1 2022 In Planning / Q2 2022 In Planning In Planning / Q1 2023
K2 Data Centres	DUB 2-3 DUB 4-5	30,000 (est) 30,000 (est)	30.72 30.72	Under Construction / Q4 2022 Under Construction / Q4 2023
Facebook	Clonee	64,000	72 (est)	Under Construction
Equinix	DB5	9,000	10.77	In Planning
Microsoft	Grange Castle	56,246	70 (est)	In Planning
EdgeConneX	South Dublin	12,797	20 (est)	In Planning

DATA CENTRE UPDATE

FRANKFURT

SUMMER 2021

CUSHMAN & WAKEFIELD

Key Indicators

Under Construction

172 MW

Vacancy

6%

Market Overview

Recent murmurs in Frankfurt indicate that data centres will come under increased scrutiny locally, and no wonder; the city continues to grow in strength and importance as a global data centre hub, now consistently enjoying 150 MW under construction at any one time and upgraded cloud and network access across many major facilities. The last several months have seen a considerable tightening in available stock, with vacancy dropping to 6% or equivalent to many of the largest global data centre locations. Further workloads are being shopped throughout the area, and key operators have responded, with Digital Realty totaling nearly a third of the total under construction. Not to be outdone, Equinix has three phases underway currently, with another five phases coming soon as part of a further push for their xScale joint venture with GIC Real Estate, the most of any city in their portfolio. Hyperscale will also be represented in the form of self-builds going forward, with Google closing on a pair of sites locally to augment recent leasing activity. Continued strength going forward then for the data centre hub for Germany, with a cautious eye toward any potential regulatory changes.

Ecosystem Developments

- **Northern Data** launched its first data centre in the Frankfurt area at the end of 2020, providing infrastructure for a variety of high-performance computing applications. The initial facility has a capacity of 400 kW, scalable to 1.5 MW as needed. The company is now working with Goethe University to conduct research toward driving efficiencies in the high-performance compute environment.
- **Eurofiber** has extended its 38,000-kilometre network to Frankfurt, adding a point-of-presence (PoP) at Equinix FR5. This new option will include access to interconnectivity platform DCspine, and the ability to connect across the Netherlands, Belgium, and France in addition to Germany.
- **Talend** added its second in-market data centre at the end of 2020, working with Amazon Web Services (AWS) to stay in line with General Data Protection Regulation (GDPR) requirements. The capacity was provisioned for the company's Stitch product, allowing for ease of use for data ingestion and warehousing.
- Local utility **Mainova** has announced the creation of a new subsidiary, with plans to directly enter the data centre sector via collaboration with internal power projects. Specific details around a first project have yet to be released, though the company stated that they plan to submit planning documents within the next year.
- **Cyxtera** added Amsterdam and Frankfurt as markets offering their bare metal service, bringing to 12 the number of locations globally. The operator is marketing the service as an option for enterprises creating a scalable hybrid environment.
- **Equinix** has also added Equinix Metal availability in eight new markets across the glove, with Frankfurt among those with new access. Equinix Metal offers full integration with Equinix Fabric and supports a variety of deployment scenarios.
- **Digital Realty** announced a second direct local onramp to Google Cloud, with the Frankfurt expansion joining new markets in Dusseldorf, Vienna, Atlanta, and Los Angeles offering the service. The onramps will enable higher performance and further peering opportunities.
- **Oracle Cloud** created the seventh global interoperability node with Microsoft Azure in springtime, with Frankfurt joining Amsterdam and London as cities offering nodes in Europe. The interconnect will provide ease of use for clients utilizing both platforms.

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DATA CENTRE UPDATE

FRANKFURT

SUMMER 2021

CUSHMAN & WAKEFIELD

Ecosystem Developments

- Polish data centre operator **Beyond.pl** is now offering a direct high-capacity fiber network among Frankfurt, Warsaw, and the company's data centers in Poznan, lowering latency to 10 milliseconds between Poznan and Frankfurt. The network could allow for Frankfurt-based enterprises to locate certain workloads outside the immediate area with potential cost savings.
- **Tencent Cloud** has added a second availability zone in Frankfurt, with the city joining three others across Asia as expansion areas for the global cloud services provider. Tencent is aiming for 30% growth in global data centre coverage this year, with further expansion across Southeast Asia and the Middle East coming soon.
- **DE-CIX** has launched a patented defense mechanism against Distributed Denial-of-Service (DDoS) attacks, with the beta version now available in Frankfurt along with Madrid and New York. Known as Blackholing Advanced, the service will provide further protection for traffic throughout the exchange.

Frankfurt has become a global leader with a consistent stream of new development, further peering opportunities, and enormous interest tightening any available vacancy.

Construction Update

OPERATOR	LOCATION	SIZE (SQM)	POWER (MW)	STAGE / EST. DELIVERY
Equinix	FR9x Phase I FR8 Phase I FR11x Phase I	3,216 4,066 5,000 (est)	10 12 (est) 14	Under Construction / Q3 2021 Under Construction / Q3 2021 Under Construction / Q2 2022
CyrusOne	Frankfurt III Frankfurt IV	3,067 11,334	4 17	Under Construction / Q3 2021 Under Construction / Q4 2022
Iron Mountain	FRA-1 Phase I	40,000	9	Under Construction / Q3 2021
Colt Data Centres	Frankfurt West	8,000	25.2	Under Construction / Q4 2021
NDC-Garbe	Hanau	10,000	10 (est)	Under Construction / Q4 2021
NTT	Frankfurt 4 Frankfurt 1	9,400 4,300	12 7.3	Under Construction / Q4 2021 Under Construction / Q2 2022
Digital Realty	Frankfurt (6 buildings)	144,315	51.54	Under Construction / Q2 2022
maincubes	FRA02	7,500	12 (est)	In Planning

Recent Site Sales

PROPERTY	SIZE (Hectares)	SALE DATE	SALE PRICE	BUYER	SELLER
Assar-Gabrielsson-Straße 13, Dietzenbach	5.8	Dec-20	€50,000,000 (est)	Google	Heidelberg Cement
Zum Fliegerhorst, Erlensee	11.6	Dec-20	€80,000,000 (est)	Google	Hillwood, Nvelop

DATA CENTRE UPDATE

LONDON

SUMMER 2021

CUSHMAN & WAKEFIELD

Key Indicators

Under Construction
320 MW

Vacancy
11%

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Market Overview

As vacancy continues to tighten toward single digits, a swathe of new projects have rolled out across London, with over 300 MW now underway through the end of 2023. Ark Data Centres leads the way with three large campuses underway, though NTT, Telehouse, Equinix, Virtus, Echelon and newcomer Global Technical Realty all have large expansion projects pushing ahead, with most operators appealing to the ever-growing hyperscale market. The recent recapitalisation of the xScale joint venture between Equinix and GIC Real Estate will also be paying local dividends in coming years, with two large projects planned for London as part of the agreement. All this development should allow London to keep roughly in line with demand, though the city continues to stand alone as the sole data centre market of consequence throughout Great Britain. As other continental locations develop secondary markets in-country (Berlin and Marseille as examples, along with prospective development in rural areas of the Netherlands), another data centre cluster in the UK seems a long way off.

The local investment market received a boost in springtime, with Digital Realty electing to sell a portfolio of pan-European assets to Singaporean REIT Ascendas. This deal included three facilities in greater London, with nearly 40 MW of data centre capacity changing hands. As with other real estate asset classes, London serves as a gateway to Europe for property acquisition and further investor interest is expected. The outlook for London remains bright, with a continued mix of established players and new entrants soon to make the area the first one-gigawatt market in Europe.

Ecosystem Developments

- **Capgemini** was awarded a £600 million infrastructure contract from the London Metropolitan Police in springtime, assuming control of all data centres and services. The focus will be on consolidation and cost savings moving forward, and shows the continued transformation across government organizations.
- In another move to the cloud, the **Ministry of Justice** signed a £23.8 million deal to move to Amazon Web Services (AWS), focusing on hosting, software, and support. The deal was the most recent for AWS, having earlier signed HM Revenue & Customs to a £94 million deal.
- **Kao Data** recently signed Civo as a new client, with the cloud platform launching its local region in the high-density environment. Civo cited the Open Compute Project (OCP) readiness of the Kao facility as a factor in their decision. Kao has also announced a new partnership with Megaport, offering further Network-as-a-Service options to optimize flexibility and lowest latency. InstaDeep signed on as a client early in 2021, with the artificial intelligence (AI) startup attracted by the robust rack density on offer.
- **AWS** has launched Wavelength zones in London on the local Vodafone network, with the goal of bringing AWS compute to the network edge. The deployment should allow for the lowest-latency applications in the public cloud environment.
- **Tampnet** rolled out an optimized network route linking Stockholm to London, with Digiplex on the Swedish end and Interxion locally as endpoints for the new fibre. The network utilizes the Tampnet South undersea cable and further backhaul to both data centres.

DATA CENTRE UPDATE

LONDON

SUMMER 2021

CUSHMAN & WAKEFIELD

Construction Update

OPERATOR	LOCATION	SIZE (SQM)	POWER (MW)	STAGE / EST. DELIVERY
China Mobile	Slough Phase II	10,000 (est)	10	Completed / Q2 2021
CyrusOne	London III	1,765	6	Under Construction / Q2 2021
Netwise	London East	1,208	1.5	Under Construction / Q3 2021
Echelon Data Centres	LCY 10	12,000	20	Under Construction / Q4 2021
NTT	Hemel Hempstead 4	9,600	24	Under Construction / Q4 2021
Equinix	LD8 Phase 4 LD7 Phase 2	971 4,017	3 5 (est)	Under Construction / Q1 2022 Under Construction / Q2 2022
Virtus	London 8 London 11	19,000 5,500	18 13	Under Construction / Q1 2022 Under Construction / Q4 2022
Telehouse	Docklands	31,000	30	Under Construction / Q1 2022
Iron Mountain	LON-2	25,000	9	Under Construction / Q2 2022
Ark Data Centres	Union Park Longcross Park Alliance Park	56,000 35,768 27,871	75 30 45	Under Construction / Q4 2022 Under Construction / Q4 2023 Under Construction / Q4 2023
Global Technical Realty	Slough	16,125	40.5	Under Construction / Q4 2022
Columbia Threadneedle	Langley	93,000	100 (est)	In Planning
Stratus Cromwell	London	90,000 (est)	100	In Planning
EdgeCore	Bracknell	8,692	20	In Planning

Recent Property Sales

PROPERTY	SIZE (SQM)	SALE DATE	SALE PRICE	BUYER	SELLER
Three Assets (Welwyn Garden City, High Wycombe, Croydon)	26,413	Mar-21	£236,600,000	Ascendas REIT	Digital Realty

The largest operators have continued to roll out new phases of construction, with the potential for half a gigawatt to be completed over the next few years.

DATA CENTRE UPDATE
PARIS
SUMMER 2021

CUSHMAN & WAKEFIELD

Key Indicators

Under Construction
55 MW

Vacancy
5%

Market Overview

The global interest in Paris that began in 2020 has continued through the first half of 2021, with absorption remaining high and vacancy rapidly tightening to 5%. Drawn by hyperscale deployments, Digital Realty is under construction on three buildings, Equinix on the first phase of the upcoming PA10, and CyrusOne will be entering the market shortly with the pre-leased initial first phase of several. Equinix plans further expansion shortly, with the recent xScale recapitalization between the REIT and GIC Real Estate planning four new buildings. Not to be outdone, a recent debt financing by DATA4 will enable another 100 MW to come online at their campus in Marcoussis across several future buildings, further expanding the largest build in France. The investment market also had an awakening early in the year, with Ascendas REIT acquiring three local data centres as part of a pan-European portfolio deal with Digital Realty. Further growth is expected throughout the next year as new capacity comes online for take-up and Paris receives more interest as a regional hub.

Ecosystem Developments

- **Telxius** has signed an agreement with Interxion in Paris to enable interconnection for the Dunant cable that links France to Northern Virginia in the United States. Dunant lands in the coastal towns of Virginia Beach and Saint-Hilaire-de-Riez, with backhaul to both primary markets. Orange and Telxius are working together on this in both areas. Recently combined Digital Realty and Interxion have three projects underway locally with over 40 MW soon to come online.
- **Amazon Web Services (AWS)** is exploring construction of a data centre campus in Bretigny-sur-Orge, adjacent to a distribution hub for the retail portion of Amazon. The development will take some time to manifest, as local concerns over water and power usage will need to be reviewed.

Construction Update

OPERATOR	LOCATION	SIZE (SQM)	POWER (MW)	STAGE / EST. DELIVERY
CyrusOne	Paris I	22,854	6	Under Construction / Q2 2021
Equinix	PA10 Phase 1	3,969	5 (est)	Under Construction / Q2 2022
Digital Realty	Paris (3 buildings)	40,955	44.4	Under Construction / Q2 2022
DATA4	Marcoussis	100,000 (est)	100	In Planning

Recent Property Sales

PROPERTY	SIZE (SQM)	SALE DATE	SALE PRICE	BUYER	SELLER
Three Assets (Montigny-le-Bretonneux, Saclay, Bievres)	17,269	Mar-21	€107,460,000	Ascendas REIT	Digital Realty

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