

SUMMARY

1.1 Digital Economy Goods & Services

According to the Bureau of Economic Analysis (BEA; www.bea.gov), the U.S. digital economy includes four major categories of goods and services, as follows:

E-Commerce

- E-commerce consists of the remote sale of goods and services over computer networks. E-commerce includes business-to-consumer e-commerce (i.e., retail trade) and business-to-business e-commerce (i.e., wholesale trade).

Federal Non-Defense Digital Services

- Federal non-defense digital services consist of the annual budgets for federal non-defense government agencies whose services are directly related to supporting the digital economy.

Infrastructure

- Infrastructure consists of the basic physical materials and organizational arrangements that support the existence and use of computer networks and the digital economy, primarily information and communications technology (ICT) goods and services. Infrastructure includes ICT hardware and software.

Priced Digital Services

- Priced digital services consist of services related to computing and communication that are performed for a fee charged to the consumer. Priced digital services include cloud services, telecommunications services, and Internet and data services.

1.2 Market Assessment

BEA assesses the U.S. annual digital economy at \$2.57 trillion. The compound annual growth rate (CAGR) is 7.1%, more than triple the Gross Domestic Product (GDP) CAGR of 2.2%.

In 2024, the global digital economy was \$12.6 trillion; the U.S. holds the dominant marketshare.

Among U.S.-based digital companies, the following rank highest in market capitalization:

- Adobe
- Alphabet/Google
- Amazon
- AMD
- Apple
- Broadcom
- Cisco
- IBM
- Meta/Facebook
- Microsoft
- Netflix
- NVIDIA
- Oracle
- QUALCOMM
- Texas Instruments

1.3 Digital Transformation

Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how they operate and deliver value to customers.

Transformation is the primary market driver of the digital economy. Recent advances in artificial intelligence (AI), cloud services, e-commerce, and other technologies present an opportunity for businesses to achieve significant gains with digital investments.

“A business may take on digital transformation for several reasons. But by far, the most likely reason is that they have to: It’s a survival issue. In the wake of the pandemic, an organization’s ability to adapt quickly to supply chain disruptions, time to market pressures, and rapidly changing customer expectations has become critical.”

The Enterprisers Project, 9/24

On the consumer side, digital technology has been accelerating in just about all categories. Increased use of mobile devices, online shopping, and streaming are the dominant shifts. These transformations are likely to remain as permanent lifestyle changes.

1.4 Segmentation

The digital economy includes 15 primary segments, as follows:

Cloud Services

- Cloud services, computing resources that are hosted by third-party providers, add \$200 billion annually in value to the U.S. economy. Ninety-eight percent (98%) of companies globally rely on the cloud for at least one part of their business applications.

Computer Hardware

- The global computer hardware market is more than \$700 billion; a compound annual growth rate (CAGR) of 6.5% is projected through 2028. Over \$1.0 trillion is spent annually on computer and electronics support services.

Data Centers

- There are 11,000 data centers worldwide; almost one-half are located in the U.S.
- Media and entertainment industries account for 35% of data center use.
- About 20% of global data center capacity is used for artificial intelligence applications.

Digital Advertising & Marketing

- Annual U.S. digital advertising and marketing spending is more than \$300 billion. The following are the primary channels and their growth rate:
 - Connected TV/streaming (20%)
 - Data infrastructure and services (10%)
 - Digital audio - radio/podcasts (11%)
 - Digital video - OTT/streaming (11%)
 - Engagement marketing - email/texting (9%)
 - Influencer marketing (15%)
 - Online display advertising (10%)
 - Paid social media advertising (12%)
 - Search (9%)

Digital Entertainment & Media

- In 2024, U.S. Internet households watched 43.5 hours of digital video per week on average across all viewing devices. Annual consumer spending for digital video on TV screens is \$200 billion.

E-Commerce: Business

- Eighty-six percent (86%) of business-to-business (B2B) companies offer an online website as a purchasing channel to their buyers. The B2B e-commerce market is 60% larger than the size of the consumer e-commerce market – more than \$2.0 trillion in 2024 and growing with a 10% CAGR.

E-Commerce: Consumer

- The U.S. Department of Commerce reported annual e-commerce sales at \$1.12 trillion, accounting for 14.6% of total retail spending. Spending surged with a peak annual growth rate of 32% during the pandemic. Spending since this peak remains well above annual GDP growth.

Information Technology

- Global information technology (IT) spending was \$5.0 trillion in 2024. According to the International Trade Administration (www.trade.gov), the U.S. is home to one-third of the global IT market.
- More than one-third of U.S. economic growth comes from IT and tech sectors.

Internet of Things

- The premise behind the Internet of Things (IoT) is that any object, whether natural or manufactured, has the ability to transmit data via the Internet. Automobiles, industrial equipment, smart cities, smart homes, and wearable devices are now commonly connected to the Internet. In 2024, there were about 20 billion connections worldwide.

Online Travel

- Online travel reservations comprise over 40% of the total travel market and over 60% of leisure and individually booked business travel. Spending was about \$290 billion in 2024.

Semiconductor Manufacturing

- In 2024, global semiconductor revenue was \$630 billion. The Asia-Pacific region has a 53% marketshare.
- The 2022 CHIPS and Science Act, which authorizes \$280 billion in funding to boost domestic research and manufacturing of semiconductors, is spurring the United States to regain leadership in this sector.

Software

- The software industry adds over \$600 billion annually to the U.S. economy, according to the Bureau of Economic Analysis (BEA). The U.S. accounts for 42.6% of the global software market.

Telecommunications

- Over 115 million U.S. households have broadband Internet access; there are 400 mobile network subscriptions.
- In 2024, the four largest U.S. telecommunications companies – Verizon, AT&T, Comcast, and T-Mobile – reported \$458 billion in annual revenue.

The Gig Economy

- The gig economy – also called the peer-to-peer marketplace and the sharing economy – lets individuals provide services, share resources, and sell goods to other individuals via online platforms. Pioneers of the gig economy – Airbnb, eBay, Uber and VRBO – have been followed by hundreds of successful startups that provide a wide spectrum of opportunities for people to make a living or add extra income.
- Between 25% and 35% of U.S. adult workers engage gig work. As of 2024, that means at least 41 million people in the United States engaged in some form of gig work.
- The U.S. gig economy is assessed at \$512 billion for 2024 and \$570 billion for 2025.
- On a global scale, The World Bank (www.worldbank.org) assessed that the gig economy accounts for up to 12% of the labor market. The global gig economy is assessed at \$3.8 trillion.

The Internet

- The Internet adds over \$150 billion annually to the U.S. economy, according to the BEA. Ninety-five percent (95%) of adults use of the Internet.
- In 2024, the five largest digital media properties (desktop and mobile) – Google, Microsoft, Facebook, Yahoo, and Amazon – reported a combined 1.2 billion unique visitors monthly.

MARKET ASSESSMENT

2.1 U.S. Market Size & Growth

The U.S. Bureau of Economic Analysis (BEA; www.bea.gov) assessed the U.S. annual digital economy as follows:

- 2017: \$1.84 trillion
- 2018: \$2.17 trillion
- 2019: \$2.06 trillion
- 2020: \$2.18 trillion
- 2021: \$2.40 trillion
- 2022: \$2.57 trillion

The digital economy in 2022 was distributed by activity as follows:

- Software: \$607 billion
- Telecommunications services: \$465 billion
- Business-to-business e-commerce: \$414 billion
- Hardware: \$294 billion
- All other digital services: \$257 billion
- Cloud services: \$192 billion
- Business-to-consumer e-commerce: \$186 billion
- Internet and data services: \$154 billion

The top five sectors contributing to the value added to the digital economy in 2022 were as follows:

- Information: \$1.024 trillion
- Professional and business services: \$ 576 billion
- Wholesale trade: \$ 502 billion
- Manufacturing: \$ 219 billion
- Retail trade: \$ 193 billion

Extrapolating using the 2022 growth rate of 6.3% provides an estimate of the digital economy as follows:

- 2023: \$2.73 trillion
- 2024: \$2.90 trillion
- 2025: \$3.09 trillion

The BEA assessment of the digital economy is an on-going project.

“BEA is developing tools to better capture the effects of fast-changing technologies on the U.S. economy and on global supply chains. These projects seek to improve measures of high-tech goods and services, consider measurement of data as an asset, and offer a more complete picture of international trade.”

Bureau of Economic Analysis, 12/6/23

2.2 Global Market Size & Growth

Global Digital Economy Forecast, 2023 To 2028, a 2024 report by Forrester Research (www.forrester.com), assesses the global digital economy as follows:

- 2023: \$11.8 trillion
- 2024: \$12.6 trillion
- 2025: \$13.5 trillion
- 2026: \$14.4 trillion
- 2027: \$15.4 trillion
- 2028: \$16.5 trillion

The CAGR is 7%. Digital transformation, online retail, and online travel are the principal drivers of global digital economic growth.

The top six digital economies by size are the United States, China, the United Kingdom, Japan, Germany, and South Korea.

TOP DIGITAL COMPANIES

3.1 Rank By Market Capitalization

Among U.S.-based digital companies traded on the New York Stock Exchange and NASDAQ, the following had the highest market capitalization as of 3Q 2024 (stock symbol in parenthesis):

• Apple (AAPL):	\$3.45 trillion
• NVIDIA (NVDA):	\$3.15 trillion
• Microsoft (MSFT):	\$3.10 trillion
• Alphabet/Google (GOOG):	\$2.05 trillion
• Amazon (AMZN):	\$1.85 trillion
• Meta/Facebook (META):	\$1.35 trillion
• Broadcom (AVGO):	\$ 770 billion
• Oracle (ORCL):	\$ 380 billion
• Netflix (NFLX):	\$ 295 billion
• AMD (AMD):	\$ 250 billion
• Adobe (ADBE):	\$ 245 billion
• Cisco (CSCO):	\$ 205 billion
• QUALCOMM (QCOM):	\$ 195 billion
• Texas Instruments (TXN):	\$ 190 billion
• IBM (IBM):	\$ 180 billion
• Intuit (INTU):	\$ 175 billion
• ServiceNow (NOW):	\$ 169 billion
• Applied Materials (AMAT):	\$ 168 billion
• Uber (UBER):	\$ 155 billion
• Palo Alto Networks (PANW):	\$ 114 billion
• Analog Devices (ADI):	\$ 113 billion
• Micron Technology (MU):	\$ 112 billion
• Arista Networks (ANET):	\$ 111 billion
• Lam Research (LRCX):	\$ 111 billion
• Automatic Data Processing (ADP):	\$ 110 billion

3.2 Rank By Revenue

Among these companies, the following had the highest annual revenue (stock symbol in parenthesis):

6.4 Market Assessment

IT spending on data center systems has been as follows (source: Statista):

- 2012: \$140 billion
- 2013: \$163 billion
- 2014: \$166 billion
- 2015: \$171 billion
- 2016: \$170 billion
- 2017: \$181 billion
- 2018: \$210 billion
- 2019: \$215 billion
- 2020: \$179 billion
- 2021: \$216 billion
- 2022: \$212 billion
- 2023: \$222 billion

6.5 Market Trends

Data centers have evolved in recent years from privately-owned, tightly-controlled on-premises facilities housing traditional IT infrastructure for the exclusive use of one company, to remote facilities or networks of facilities owned by cloud service providers housing virtualized IT infrastructure for the shared use of multiple companies and customers.

The following are market drivers for data center capacity:

- The growing demand for cloud and hosting services is driving the need for data center services. This demand is spurring investments in data center construction and expansion.
- Digital transformation initiatives in multiple industries is also driving the need for robust data center infrastructure.
- The increase of the Internet of Things (IoT) adds another layer of demand. These devices often produce substantial data volumes, necessitating recording, processing, storage, assessment, and retrieval. Emerging digital arenas, like smart cities and intelligent buildings, require large volumes of readily accessible data.

There is concern about the high energy consumption required to run data center computing equipment and to cool the equipment. Data centers (excluding cryptocurrency mining) and data transmission each use 1% to 2% of world electricity.

According to Cushman & Wakefield, data centers consumed 7.4 Gigawatts of power in 2023. The electricity used by data centers could power 6,482,400 average American homes. A May 2024 study by the Electric Power Research Institute (www.epri.org) estimated that U.S. data center power consumption could range from 4.6% to 9.1% of the country's generation by 2030.

6.6 Market Resources

2024 Global Data Center Market Comparison, Cushman & Wakefield, July 2024.
(www.cushmanwakefield.com/en/insights/global-data-center-market-comparison)

Data Center Dynamics (www.datacenterdynamics.com)

Data Center Services Market, Global Market Insights, June 2024.
(www.gminsights.com/industry-analysis/datacenter-services-market)

Data Center Services Market Size & Share Analysis - Growth Trends & Forecasts, Mordor Intelligence, August 2024.
(www.mordorintelligence.com/industry-reports/service-market-for-data-center)

Data Centers - Statistics & Facts, Statista.
(www.statista.com/topics/6165/data-centers/#topicoverview)

Directory of Data Centers. (www.datacenters.com)

What Is A Data Center? IBM. (www.ibm.com/topics/data-centers)

DIGITAL ADVERTISING & MARKETING

7.1 Market Assessment

Winterberry Group (www.winterberrygroup.com) assessed U.S. digital advertising and marketing spending as follows (change from previous year in parenthesis):

- 2019: \$154.0 billion
- 2020: \$184.5 billion
- 2021: \$253.1 billion
- 2022: \$287.4 billion
- 2023: \$320.0 billion

Digital advertising and marketing spending by channel in 2023 was as follows (change from prior year in parenthesis):

- Search: \$107.5 billion (9.3%)
- Paid social: \$ 69.1 billion (12.2%)
- Display: \$ 50.8 billion (10.4%)
- Digital video (OTT/streaming): \$ 26.2 billion (10.9%)
- Connected TV/streaming: \$ 20.1 billion (20.1%)
- Digital audio (radio/podcasts): \$ 8.4 billion (11.0%)
- Engagement marketing: \$ 6.5 billion (9.2%)
- Influencer: \$ 6.3 billion (15.0%)
- Mobile gaming: \$ 6.3 billion (11.1%)
- B2C lead generation: \$ 5.0 billion (6.0%)
- Digital out-of-home: \$ 4.3 billion (19.1%)
- Affiliate network fees: \$ 4.0 billion (8.7%)
- Total digital: \$320.0 billion (11.3%)

Marketing data spending in 2023 was \$31.7 billion, distributed as follows (change from previous year in parenthesis):

- Data infrastructure: \$13.4 billion (11.3%)
- Data services: \$10.0 billion (6.0%)
- Data: \$ 8.3 billion (3.0%)

7.2 Internet Advertising Revenue

According to the *IAB Internet Advertising Revenue Report, 28th Edition*, by the Interactive Advertising Bureau (IAB, www.iab.net) and PricewaterhouseCoopers (PwC, www.pwc.com), digital advertising spending has been as follows:

	Desktop/Laptop	Mobile	Total
• 2005:	\$12.5 billion	-	\$ 12.5 billion
• 2006:	\$16.9 billion	-	\$ 16.9 billion
• 2007:	\$21.2 billion	-	\$ 21.2 billion
• 2008:	\$23.4 billion	-	\$ 23.4 billion
• 2009:	\$22.7 billion	-	\$ 22.7 billion
• 2010:	\$25.4 billion	-	\$ 26.0 billion
• 2011:	\$30.1 billion	\$ 1.6 billion	\$ 31.7 billion
• 2012:	\$33.2 billion	\$ 3.4 billion	\$ 36.6 billion
• 2013:	\$35.7 billion	\$ 7.1 billion	\$ 42.8 billion
• 2014:	\$37.0 billion	\$ 12.5 billion	\$ 49.5 billion
• 2015:	\$38.9 billion	\$ 20.7 billion	\$ 59.6 billion
• 2016:	\$35.9 billion	\$ 36.7 billion	\$ 72.6 billion
• 2017:	\$38.2 billion	\$ 50.1 billion	\$ 88.3 billion
• 2018:	\$37.6 billion	\$ 69.9 billion	\$107.5 billion
• 2019:	\$37.9 billion	\$ 86.7 billion	\$124.6 billion
• 2020:	\$41.5 billion	\$ 98.3 billion	\$139.9 billion
• 2021:	\$54.2 billion	\$135.1 billion	\$189.3 billion
• 2022:	\$55.6 billion	\$154.1 billion	\$209.7 billion
• 2023:	\$59.6 billion	\$165.4 billion	\$225.0 billion

In 2023, digital advertising was distributed by format as follows (change from prior year in parenthesis):

• Search:	\$88.8 billion (5.2%)
• Display:	\$66.1 billion (4.0%)
• Digital video:	\$52.1 billion (10.6%)
• Digital audio:	\$11.0 billion (18.9%)
• Other:	\$ 7.0 billion (-20.4%)

Emarketer (www.emarketer.com) assessed 2023 digital ad spending by sector as follows (change from prior year in parenthesis):

• Retail:	\$73.55 billion (12.2%)
• Consumer packaged goods:	\$39.50 billion (6.1%)
• Financial services:	\$30.02 billion (3.9%)
• Consumer electronics:	\$22.24 billion (1.9%)
• Healthcare & pharmaceuticals:	\$19.37 billion (10.8%)
• Automotive:	\$19.10 billion (10.0%)
• Telecommunications:	\$15.93 billion (2.7%)
• Entertainment:	\$15.17 billion (7.9%)
• Media:	\$14.23 billion (6.8%)