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Transformation

AI dictionary, part 2: The next generation

02 July 2025

Key takeaways

- With the AI basics covered in the first part of this three-part series, the second iteration of our AI dictionary answers the question, "What comes next?" From artificial general intelligence to artificial super intelligence, we demystify the technology and look at what's ahead.
- Many of us are familiar with early forms of generative AI in the form of chatbots. But its reach is now extending to other modalities such as AI agents, autonomous vehicles and humanoid robots in the physical world.
- With $2.5 trillion announced year to date for AI development, and inference costs dropping 280x in just 1.5 years, innovation is accelerating and the future of AI might be closer than we think.

Agentic AI

What is it?

Agentic AI refers to AI systems that can achieve a set goal or task with limited supervision.[1] They are made up of AI agents that can autonomously make decisions or perform tasks on behalf of the user or another system, utilizing reasoning capability to choose the correct tools for the job. Agentic AI represents a new generation of increasingly powerful foundation models that act as operating systems for autonomous, action-taking, digital agents capable of enhanced reasoning and decision-making, as well as increasingly disruptive chatbots and copilots (see our previous publication, The new wave: Agentic AI, for more).

For example, agentic AI could be used to fill out forms, make dining reservations, book travel or order groceries. This differs from a generative AI model that might produce content, in that an agentic AI system can use the generated content to complete tasks autonomously. This is also in contrast to traditional AI models, which operate within predefined constraints or require human input.

As mentioned in part one of this series, generative AI emerged after eight decades of iterative advances that raised the upper bounds of computational capacity and reduced the time and cost to train capital-intensive foundation models. However, the third wave, Agentic AI, arrives only two years after ChatGPT launched AI's second wave (Exhibit 1).

Exhibit 1: Agentic AI and autonomous action-taking agents mark the beginning of AI's third wave
The AI Waves – from the first wave beginning in the '40s to the third wave beginning in 2024

	The AI Waves		
	First Wave	Second Wave	Third Wave
Technology	Pre-GenAI	GenAI	Agentic AI
Time	1940 - Nov'22	Nov'22 - Oct'24	Oct'24 - TBD
Applications	NA	Chatbots & Copilots	Autonomous Agents

Source: BofA Global Research
Note: Nov'22 represents ChatGPT's launch on Nov 30, 2022, which marked the beginning of the GenAI wave, in BofA Global Research's view. Apps for the first wave are listed as "NA" because ChatGPT introduced the consumer-friendly user interface that democratized access to powerful computer intelligence.

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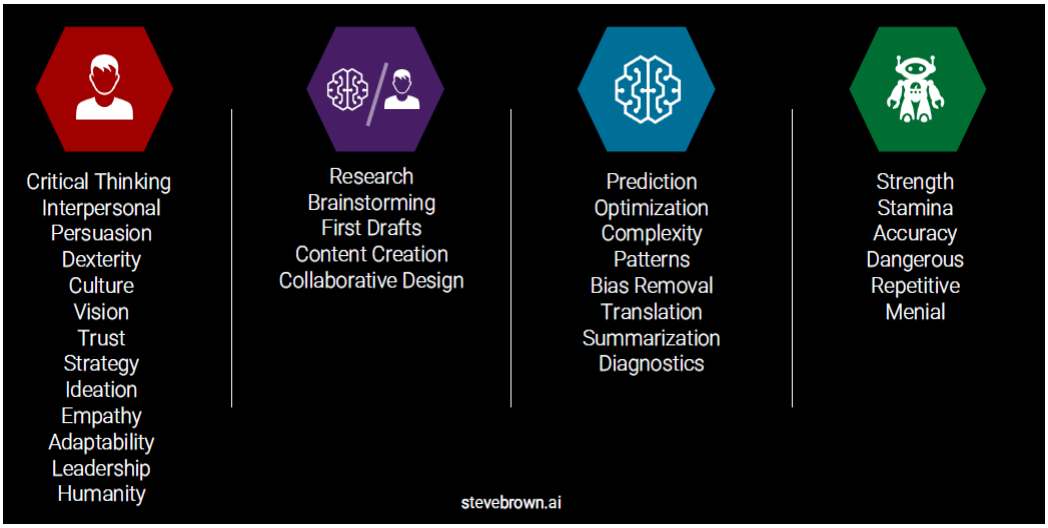
Chatbots for general tasks and copilots for specialized ones will likely gain increasingly disruptive functionality as the underlying foundation models that power them advance, but these advances also enable agents, i.e., agentic AI, to thrive. Chatbots and copilots (i.e., AI that acts as a "virtual assistant" by providing support, suggestions and automating tasks) will ultimately complement agents as they develop and mature, but consumer and enterprise adoption of them may accelerate as capabilities advance. As seen in Exhibit 2, enterprise introduction of agentic AI will elevate the need for workflow orchestration and task

[1] Stryker, C. (n.d.). *What is agentic AI?* IBM. https://www.ibm.com/think/topics/agentic-ai

management, as roles are distributed between humans, robots, and AI systems, depending on skills required. BofA Global Research expects consumer and enterprise generative AI usage to increase throughout this year before accelerating in 2026 as consumer products integrate more generative AI features and as pilot projects move to production.

Exhibit 2: Agentic AI could increase the need for workflow orchestration and task management, choosing between humans, robots, and AI systems to complete tasks independently or collaboratively based on competencies.
Illustration of Human / Machine skills and teaming



Source: Steve Brown; BofA Global Research

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AI-enriched simulations

What is it?

Simulation is a model that mimics the operation of an existing or proposed system, material, or process before actual manufacturing and deployment in the real world. AI-enhanced simulation combines AI and simulation technologies to run those models faster and cheaper, especially in industries where accuracy and efficiency are critical, such as aerospace, materials science, and automotive.[2]

In the past, simulation relied on pre-programmed rules and static data, but AI-enriched simulations allow for a process of continual improvement. They can learn and adapt based on the data they process and scenarios they encounter. In turn, AI-enriched simulations can take a theoretical model, simulate it virtually many times, and make small changes with each attempt to see which structure is optimal.

Many of our everyday products are complex and over time designers have come to rely on computer-driven simulations but they often take time to run. Even once possibilities are found, additional simulations need to be run to ensure safety. AI simulation combines techniques from quantum physics and deep learning to enable sampling a vast dataset quickly and efficiently. AI and simulation technologies bring the ability to take a molecular structure and simulate it billions of times, making small changes each time to see which structure is optimal. We can now do this in a matter of weeks and months – a task that would take 10 years in the physical world.

Accelerating innovation across industries

AI-enriched simulations can be used for drug discovery, innovations in semiconductor design, chemicals, materials, aerospace, automotive and optics, and even portfolio optimization in finance.[3] In fact, AI has helped to discover 45x more crystals ever known to man. And in just 48 hours, AI did a decade of research on the antimicrobial resistance of superbugs.[4] Elaborating on a few examples:

- **Chip design:** Electronic design automation (EDA) vendors have made tools for chip design using rule-based systems and physics simulation. But now AI can help chipmakers push the boundaries of Moore's Law (the observation that the number of chips in a circuit doubles every two years) further. Simulation can design chips faster than older methods and make new and better chips. All in all, these tools can increase supply chain security and help mitigate shortages.

[2] El Hout, M. (2024, March 6). *The Intersection of AI and Simulation Technology*. Ansys. https://www.ansys.com/blog/simulation-and-ai
[3] Ansys.
[4] Gerken, T. (2025, February 20). *AI cracks superbug problem in two days that took scientists years*. BBC. https://www.bbc.com/news/articles/clyz6e9edy3o

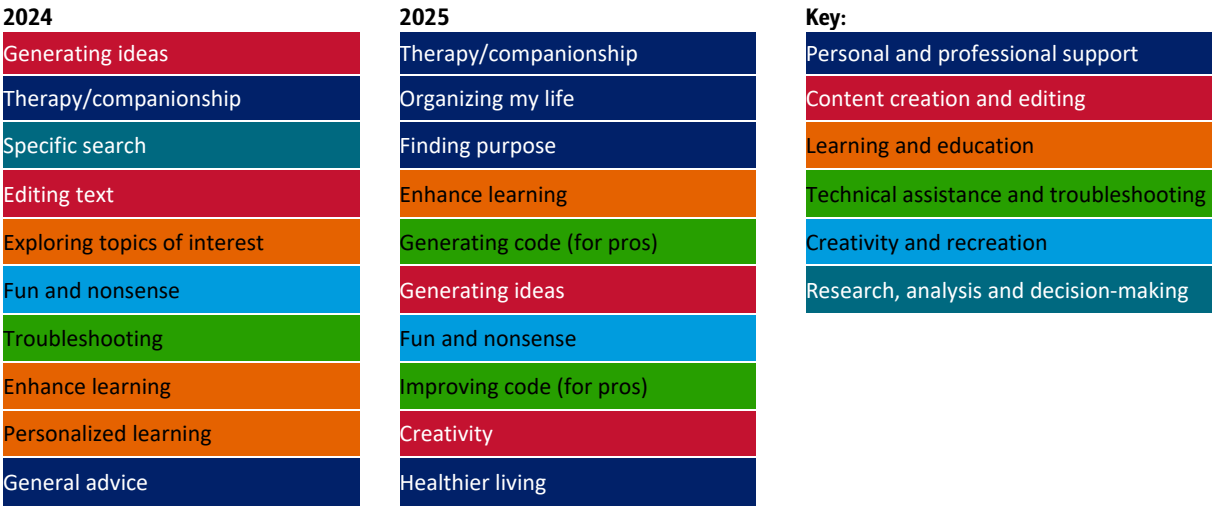
- **Drug discovery:** The drug discovery process often includes high costs and high failure rates. In fact, the average investment is $1-4 billion, with a timeframe of 10 to 15 years to develop new drugs and a 90% failure rate. AI simulation can help overcome these challenges, as it can simulate different drugs faster and cheaper. New AI simulation work can change sectors such as life sciences from a business of mostly failure to one with more predictable revenues, as it allows companies to take all the data and molecular information and run billions of simulations de-risking the molecules, reducing drug development time dramatically.

Artificial emotional intelligence

What is it?

Today, the top use cases for generative AI are showing a shift from technical applications to more emotional ones (Exhibit 3). Artificial emotional intelligence (AEI), or emotional AI, is a type of AI that can read, recognize, and interpret human emotions by analyzing body language data, including facial expressions, tone of voice, and gestures.[5] These systems use a combination of computer vision, sensors, cameras, real world data and deep learning to gather and analyze the data. Once AI identifies the emotion, it can interpret what it might mean in each case. In this way, the algorithms can improve at identifying the nuances of human communication, allowing AI to interact with humans more "naturally."

Exhibit 3: In 2025, the top generative AI use cases show a shift from technical (e.g. idea generation, search and editing) to more emotional applications (e.g. therapy, personal productivity and development)
Top 10 generative AI use cases



Source: "How People are Really Using Generative AI Now," Marc Zao-Sanders, Co-Founder of Filtered.com; Filtered.com; BofA Global Research

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Applications in people-facing roles

AEI can be used in people-facing applications. For example, in customer service, AEI systems can offer more personalized and empathetic responses. A call center agent might use AEI to identify a customer's frustration and provide more helpful and understanding support. In education, AEI could customize education systems and adapt lesson content to an individual's learning style and emotional state. Even in healthcare, AEI could give a patient better personalized healthcare feedback and emotional support.[6]

But is it ethical to collect data on emotions?

AEI relies on personal data to infer emotions, which can raise ethical and privacy concerns. The importance of ethics is evident in regulation like the European Union (EU) AI Act, passed in May 2024, prohibiting AI from manipulating human behavior and banning emotion-recognition technology from spaces such as the workplace and schools. However, the Act makes a distinction between identifying expressions (allowed) and inferring emotional states from them (not allowed). For example, detecting if a person sounds happy versus inferring they are, in fact, happy.[7] We discuss more about this Act in part three of our series.

[5] Price, L. (2023, December 19). *Artificial Emotional Intelligence: What exactly is it? What is the potential of AEI in Healthcare?* Nelson Advisors Blog. https://www.healthcare.digital/single-post/artificial-emotional-intelligence-what-exactly-is-it-what-is-the-potential-of-aei-in-healthcare
[6] Price, L. (2024, November 30). *What is the potential of Artificial Emotional Intelligence in Healthcare?* Nelson Advisors Blog. https://www.healthcare.digital/single-post/what-is-the-potential-of-artificial-emotional-intelligence-in-healthcare
[7] Miles, N. C. (2024, June 23). *Are you 80% angry and 2% sad? Why "emotional AI" is fraught with problems.* The Guardian. https://www.theguardian.com/technology/article/2024/jun/23/emotional-artificial-intelligence-chatgpt-4o-hume-algorithmic-bias

Artificial general intelligence

What is it?

Artificial general intelligence (AGI), or strong AI, is a hypothetical AI agent that can match or exceed human-level cognitive abilities across any task.[8] AGI is the theoretical pursuit to develop systems that have self-control, self-understanding, and self-learn new skills.[9] With these skills, a system can solve problems that it may not have been able to solve when it was first created.

AI vs AGI? Weak vs strong AI?

AI allows software to solve novel and difficult tasks at the same level as a human. However, AGI can solve problems in different domains without manual intervention because it can self-learn.[10] In this way, AGI is a theoretical concept of AI, which solves complex tasks with generalized human-level abilities.

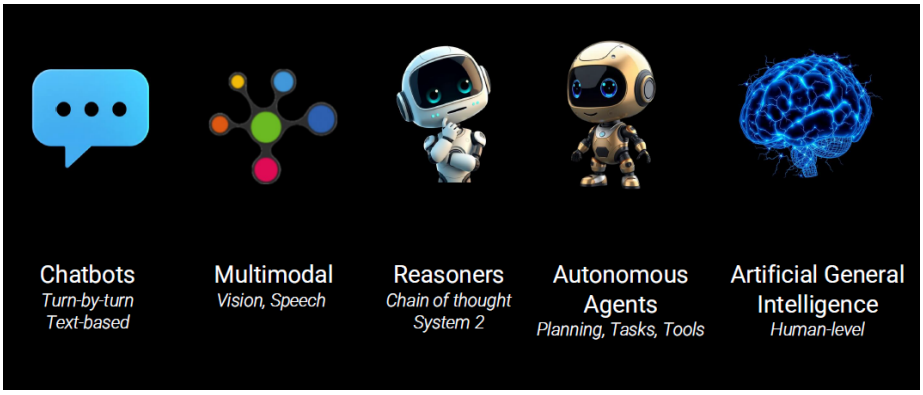
The terms strong and weak AI are also relevant. Strong AI is another term for AGI, whereas weak AI refers to systems limited to the specific tasks they are designed for. For example, generative AI refers to deep learning models that can generate high-quality content, based on the data they were trained on.[11] The ability of an AI system to generate content does not mean its intelligence is general.[12]

What would it take to turn AI into AGI?

There are several capabilities that are characteristic of AGI systems:[13]

- **Sensory perception:** AI systems still do not have human-like sensory perception capabilities, e.g., color detection, determining spatial characteristics from sound, etc.
- **Fine motor skills:** Dexterity to do everyday things that the average human can do. e.g., finding a set of keys.
- **Natural language understanding & problem solving:** Full comprehension of books, articles, videos and common-sense knowledge to operate in the real world, e.g., recognizing that a light bulb is blown and needs changing.
- **Navigation:** Leveraging GPS (global positioning system) or projecting actions through imagined physical spaces.
- **Social and emotional engagement:** Humans must want to interact with the AI system, not fear them. To be able to interact with humans, robots need to understand humans, interpret facial expressions or changes in tone.

Exhibit 4: AI is evolving from chatbots, to multimodality, reasoning AI, AI agents, combining these skills towards human-level intelligence
The Path to AGI – towards human-level intelligence



Source: Steve Brown, BofA Global Research

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[8] Bergmann, D., & Stryker, C. (2024, September 17). *What is artificial general intelligence (AGI)?* IBM. https://www.ibm.com/think/topics/artificial-general-intelligence
[9] Amazon Web Services. (n.d.). *What is AGI? - Artificial General Intelligence Explained - AWS*. Amazon Web Services, Inc. https://aws.amazon.com/what-is/artificial-general-intelligence/
[10] Ibid.
[11] Martineau, K. (2023, April 20). *What is generative AI?* IBM. https://research.ibm.com/blog/what-is-generative-AI
[12] Baum, J., & Villasenor, J. (2023, July 18). *How close are we to AI that surpasses human intelligence?* Brookings. https://www.brookings.edu/articles/how-close-are-we-to-ai-that-surpasses-human-intelligence/
[13] McKinsey & Company. (2024, March 21). *What is Artificial General Intelligence (AGI)?* McKinsey & Company. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-artificial-general-intelligence-agi

The key to unlocking AGI

According to BofA Global Research, hallucination (when a model generates factually incorrect, irrelevant or nonsensical output) and AI planning capabilities could be two things to overcome before reaching AGI. AI planning refers to the process of using autonomous techniques to solve planning and scheduling problems. For example, building a house requires a specific sequence of steps: first laying the foundation, then constructing the wall. Per AI futurist, Steve Brown, AGI follows after achieving reasoning AI, and at that point it is no longer a research problem but an engineering problem.[14] Exhibit 4 elaborates on this evolution of AI systems and the pathway to accomplishing AGI.

Is AGI coming sooner than we think?

Since the first discussions about general AI and technological singularity by mathematician Von Neumann in the mid-20th century, scientists and technologists have repeatedly predicted the coming of human-level intelligent machines in the near term. However, with repeated failure to deliver, the industry has seen waves of investment interest and decline. Yet, this decade has seen a resurgence of interest as the growth of data computing power and technological innovation (such as improved architecture of processors) has continued to explode. Many AI experts believe that human-level AI will be developed in the next decade, and some think much sooner. Only time will tell.

Artificial super intelligence (ASI)

What is it?

Artificial super intelligence (ASI) is a hypothetical stage of AI development where machine intelligence surpasses human intelligence. ASI would transform the way the world works at a fundamental level, and some say that ASI would be the last invention humanity would ever create.

How are AGI and ASI different?

While AGI is a step towards achieving human-level intelligence, ASI represents a leap beyond that, surpassing human-level capabilities in every way.[15] It would be able to make the best possible decisions and solve the most complex problems for every industry.[16]

ASI by 2037?

AI expert speaker, Mo Gawdat, identifies two phases of development for AI between now and 2037:[17]

- **Phase 1 – AI (2023-2037):** This could be the most challenging era in human history, owing to the immediate use of abundance intelligence to feed a scarcity mindset. Why? In this period, we can create technologies and solutions but do not know how to use them correctly. When humans try to control or use these in the traditional way of thinking, they could bring risks. Incredibly fast change in technology (AI), economics, geopolitics, climate, and synthetic biology all in the same period, could have unintended consequences.

- **Phase 2 – ASI (Post-2037):** Machines could be 10,000x smarter than humans, and the intelligence of AI could match the intelligence of life itself, perfecting everything from economic models to emission free flights. Why? Life is more intelligent than humanity.

Embodied/Physical AI

What is it?

Embodied AI (or physical AI) refers to the integration of AI into a physical system, such as humanoid robots and autonomous vehicles (AVs), which enables AI to interact with the physical world.[18]

AI is enabling rapid progress in robots, given the ability to program and interact with them via language models. The term "embodied AI" was first used to describe the branch of AI that focuses on how computers, systems, and technology can interact with the physical world. It typically includes AI for sensorimotor skills, navigation, and real-world interactions. But with the rise of generative AI, embodied AI is also being used to give this technology a physical form, typically a robot including autonomous vehicles and drones. The next half a decade will be the breakthrough years of robotics, thanks to AI.

Embodied AI approach would be to teach the robot to guess until it gets it right

Robots use AI to interact with the physical world and to learn from their interactions. They are equipped with a range of sensors and computer vision to take in data from the real world. Combined with generative AI, they can "learn" from this data and exhibit

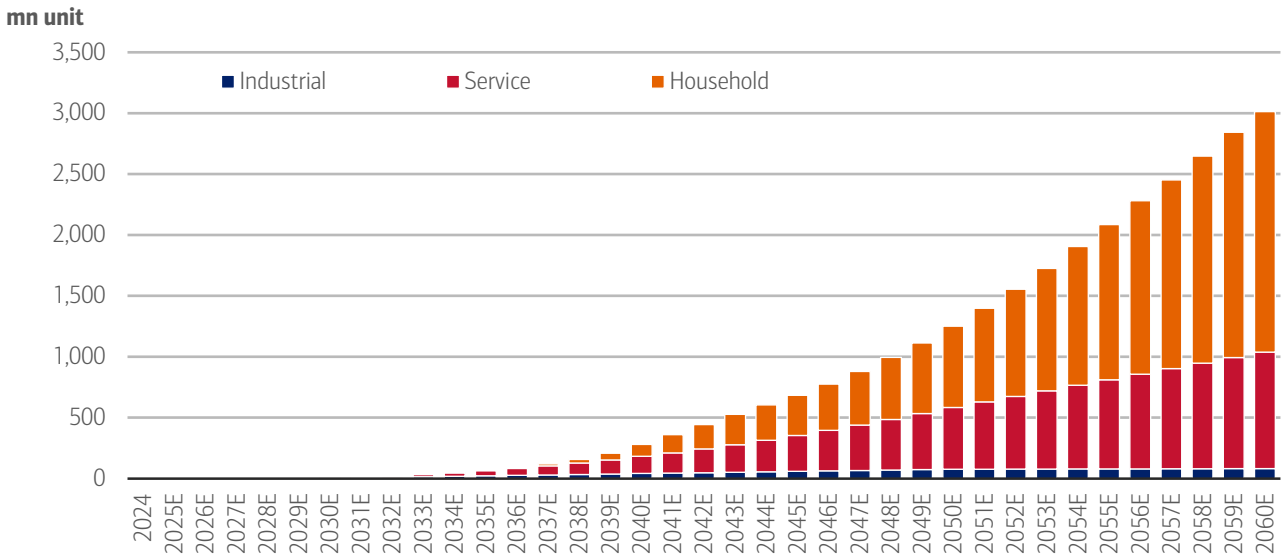
[14] Steve Brown.
[15] Rafalski, K. (2025, May 8). *AGI vs ASI: Understanding the Fundamental Differences Between Artificial General Intelligence and Artificial Superintelligence.* Netguru. https://www.netguru.com/blog/agi-vs-asi
[16] Mucci, T., & Stryker, C. (2023, December 18). *What is artificial superintelligence*? IBM. https://www.ibm.com/think/topics/artificial-superintelligence
[17] Mo Gawdat.
[18] NVIDIA. (n.d.). *What is Embodied AI?* NVIDIA. https://www.nvidia.com/en-us/glossary/embodied-ai/

conversational and situational awareness. For example, to teach a robot to pick up a book, the traditional AI method would be to program it with the movements needed. In contrast, the embodied AI approach would be to teach the robot to guess, by having it make random attempts and learn from each until it achieves the goal.

New applications...towards autonomy? Embodied AI will bring new use cases

Innovations in metals (to make them stronger and lighter) and batteries (to extend battery life) are enabling embodied AI to become a reality. To better illustrate the impact of these changes, see Exhibit 5, which forecasts increased usage of humanoid robots across various applications. There are opportunities to enhance productivity and remove dangerous or onerous tasks from humans. Typically, we might think of robots as enabling us to automate tasks, with humans being the principal and robots being the agent. But as these robots become more capable of self-learning and completing tasks without being pre-programmed, their direction may shift from one of automation to autonomy. Our recent publication, Humanoid robots 101, has more on this topic.

Exhibit 5: Total units in ownership (UIO) could reach 3 billion by 2060E
Long-term forecast of humanoid robot UIO between industrial, service and household applications.



Source: BofA Global Research

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End-Device AI

What is it?

End-device AI refers to the deployment of AI functions or models on local devices (smartphones, autos, and wearables). Due to long data transmission paths, transferring data from end-devices to the cloud (network of remote servers accessed via internet) introduces costs and issues, such as longer latency, power consumption, bandwidth, server capacity, and private information leakage, which can lower the service quality. Therefore, end-device AI helps share the power load of large servers to improve the performance of the broad AI ecosystem.

In comparison, there are also edge AI and cloud AI (Exhibit 6). Edge AI offloads AI and machine learning processing from the cloud to powerful servers at the edge of the network, such as offices, 5G base stations, and other physical locations near the connected endpoint devices. Alternatively, with cloud AI, the collected data/prompts are sent back to data centers, and then the end-devices take the calculated results from big data pools on the cloud.

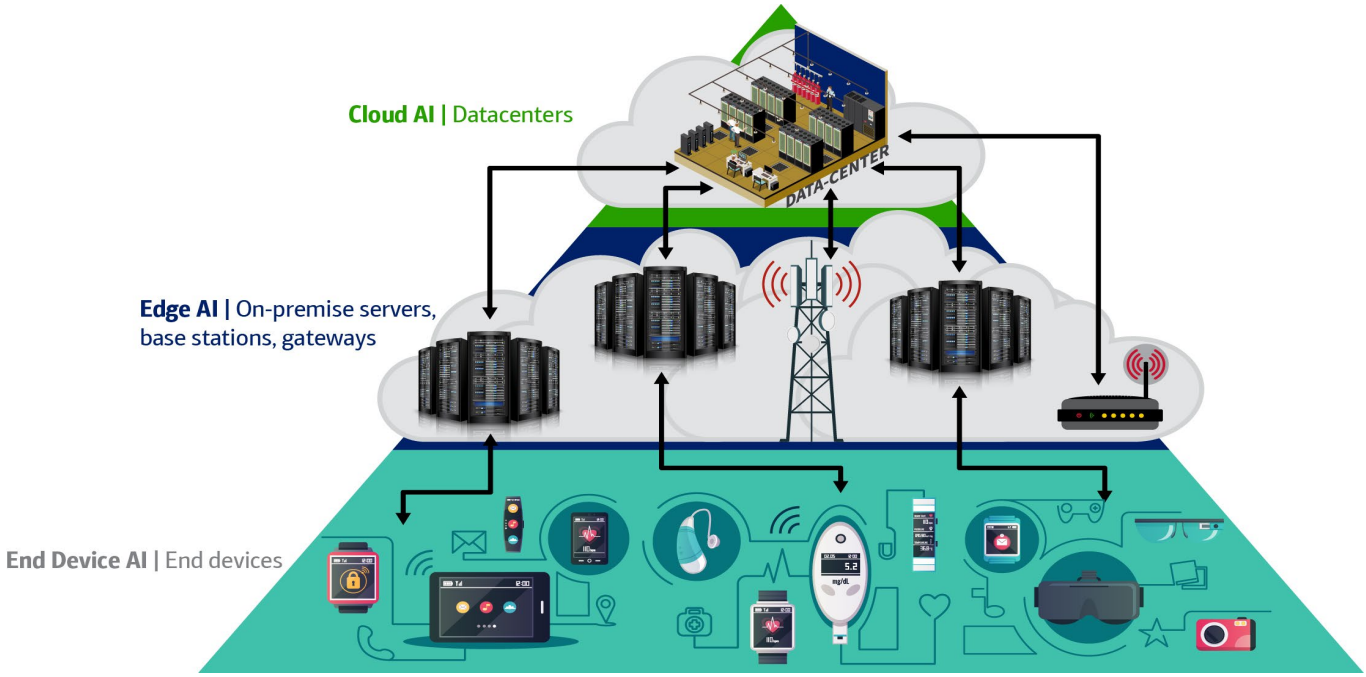
More achievable due to wireless connectivity (e.g., 5G, Wi-Fi) and IoT

5G is one megatrend driving growth. It offers high-speed, low-latency, wide-range connection for AI, especially on the end-device side, while AI computing could enhance 5G's transmission performance and efficiency.

5G Advanced refers to the next phase of development and deployment of 5G wireless technology and networks and is the first mobile network with embedded AI, dramatically increasing capabilities and decreasing costs. It builds on early 5G networks and aims to deliver faster speeds, lower latency, increased capacity, and more uniform coverage.

5G Advanced is not a revolution but an evolution of the 5G technology and broadly based on common architecture. However, the improvement in the architecture and technology not only drives continued system enhancements but could also be the foundation technology to 1) increase the number of use cases, 2) support high-data, low-latency demanding applications like holograms, XR and autonomous vehicles, and 3) even lay the technical foundations for 6G.

Exhibit 6: End-device AI will be processed on end-devices; edge AI in physical locations near to end-devices; cloud AI in data centers
Ecosystem of end-device AI, edge AI, and cloud AI



Source: BofA Global Research, Infineon, company data.

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The race to fight "bandwidth scarcity" will not bypass short-range communication. Wi-Fi 7 is the revolution in that space and will be a key pillar in the next generation of communication. Developed by the Wi-Fi Alliance and officially launched this year, Wi-Fi 7 (or its professional name: IEEE 802.1) is the next generation of Wi-Fi 6, offering five times more speed, leapfrog capacity and a 75% drop in latency compared to the previous Wi-Fi generation.

As we have witnessed in mobile communication technology, applications require ever-more speed and bandwidth, which previous Wi-Fi generations can no longer support, clogging up the network. The need for reliable networks with minimal latency for certain applications was also more challenging for the previous generation. Wi-Fi 7 protocol will provide the solution for applications like AI, the internet of things (IoT), the cloud, home entertainment and XR (extended reality).

Benefits and challenges of end-device AI

The key features of end-device AI compared with edge or cloud AI include lower latency, higher power efficiency, limited cost, and higher context awareness (Exhibit 7), which could translate into the following benefits, according to BofA Global Research:

- **Faster response time**: Some simple AI tasks only require AI computing with local storage capacity on the end-device side. In such use cases, adopting end-device AI could lead to faster response times when compared to capturing data from the cloud.
- **Better accessibility for consumers**: Given end-devices are physical and closest to end-users, the AI processing on them could lead to better accessibility.
- **Better privacy and communication security**: With higher security requirements on the end-device side (e.g., face recognition/fingerprint identification, one-time password, text password, etc.) for personal information protection, the security level could be higher if data remains local.
- **Offloading from cloud**: Edge devices with computing power could share the cloud's burden to improve the overall AI service.

Exhibit 7: End-device AI's advantages include lower latency/cost, power efficiency, higher context awareness, etc.
Comparison of end-device AI, edge AI, and cloud AI

Features	End-device AI	Edge AI	Cloud AI
Use cases	Smartphones, cars, white goods, security cameras, wearables, street lights, etc.	On-premise servers, base stations, IoT gateways	Data centers
Latency	Low	Medium (10us-10ms+)	High (100ms+)
Bandwidth required	Low	Medium	High
Processing power	Low	Medium	High
Storage capacity	Low	Medium	High
Security	High	Medium	Medium (cloud back-up)
Computing cost	Low	Medium	High
Context awareness	High	Medium	Low
Power efficiency	High	Low	Low
Maintenance & Upgradeability	Medium	Medium	High (centralization)

Source: BofA Global Research

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However, to perform end-device AI tasks locally and connect with the edge and/or cloud for more complex AI tasks, there may be some key challenges:

- **Power consumption**: End-devices like smartphones and smart watches are close to end-consumers and run on battery power, and thus power consumption needs to stay at low levels even if they are equipped with more features.
- **Cost**: The increasing semiconductor content needed to support more AI functions should inevitably lift the cost of end-devices.
- **Algorithm/software**: As end-devices have limited resources, including processing power, memory, and storage, the AI/ML algorithm and related software must be optimized to work within these constraints.
- **Security**: One of the most significant challenges of end-device/edge AI is data privacy disclosure. End-devices and the edge servers store and process a large amount of data, including sensitive personal information. This makes them attractive targets for cyberattacks.

Reasoning AI

What is it?

Reasoning AI refers to AI models that solve complex problems by breaking them down into smaller steps and using logical reasoning – "thinking" through the answers step-by-step, rather than by generating an answer immediately. While some AI models show their logical reasoning, others do not. However, reasoning AI models are trained to show their working or thinking and follow a more structured thought process.[19] Thus far, generative AI has used algorithms for solving tasks with rapid thinking, with increasingly sophisticated versions due to their emergent properties. But the new versions of models can break down complex problems into separate tasks and hypotheses, using "reasoning" to reach a solution – like human thinking.

More compute requirements at the inference stage

Adding human-thinking mechanisms into the models means the AI model is not only learning during training time, but also during the usage stage. This means that there are increasing compute requirements at the inference stage of designing and implementing a model.

[19] Microsoft.

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