IonQ Investor Updates

August 2025

Cautionary Notes

This presentation contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Some of the forward-looking statements can be identified by the use of forward-looking terms. Statements that are not historical in nature, including the terms “accelerating,” “access,” “accessible,” “anticipate,” “available,” “believe,” “can,” “capable,” “deliver,” “designed to,” “deployable,” “enabling,” “estimate,” “expect,” “expected,” “future,” “goal,” “growth,” “increased scale,” “intend,” “impact,” “latest,” “leader,” “leading,” “may,” “pending,” “planned,” “scale,” “target,” “will,” “winning,” “potential,” and other similar expressions are intended to identify forward-looking statements. These statements include those related to the company’s expansion in the quantum computing, security, and networking market segments; the company’s technology driving commercial advantage or delivering scalable, fault-tolerant quantum computing in the future; the ability for third parties to implement IonQ’s offerings in their data centers and to reduce their compute costs; the energy efficiency and sustainability of the IonQ’s offerings; the efficacy of new applications of quantum computing; the relevance and utility of quantum algorithms and applications run on IonQ’s quantum computers; the size of quantum computing, security, and networking market segments in the future; IonQ’s quantum computing, security, and networking capabilities and plans; future deliveries of and access to IonQ’s quantum services, computers, and networking devices; access to IonQ’s quantum computers including hybrid-enabled functionality; increases in algorithmic qubit achievement; future purchases of IonQ’s offerings by customers using congressionally-appropriated funds from the U.S. government; IonQ closing anticipated acquisitions; the success of partnerships and collaborations between IonQ and other parties, including development and commercialization of products and services with such parties; and the scalability, reliability, performance, modularity, commercial-readiness, and architectural advantages of IonQ’s offerings. Forward-looking statements are predictions, projections and other statements about future events that are based on current expectations and assumptions and, as a result, are subject to risks and uncertainties. Many factors could cause actual future events to differ materially from the forward-looking statements in this presentation, including but not limited to: changes in the competitive industries in which IonQ operates, including development of competing technologies; any inadequacies in the overall pace of technology development in the quantum industry, including inadequate advances in the state of quantum networking and quantum systems; IonQ’s relatively limited history in developing quantum networks; the capability of our quantum systems and quantum networks to provide transformative applications and commercial quantum advantage; changes in laws and regulations affecting IonQ’s business; IonQ’s ability to enter new markets and exploit new technologies; IonQ’s ability to implement its business plans, forecasts and other expectations, identify and realize partnerships and opportunities, and to engage new and existing customers; changes in U.S. government spending or policy that may affect IonQ’s customers; changes to U.S. government goals and metrics of success with regard to implementation of quantum computing; risks associated with U.S. government sales, including availability of funding and provisions that allow the government to unilaterally terminate or modify contracts for convenience; satisfaction of conditions to close acquisitions by IonQ and counterparties; IonQ’s inability to effectively integrate its acquisitions; IonQ’s ability to attract and retain key personnel, including Lightsynq personnel joining IonQ; IonQ's ability to utilize the technology of acquired companies to accelerate the development and scale of IonQ’s systems and offerings; and IonQ’s ability to work effectively with collaborators in existing or planned partnerships, including the effectiveness of integration of IonQ’s technology with collaborators’ technology. You should carefully consider the foregoing factors and the other risks and uncertainties disclosed in the Company’s filings, including but not limited to those described in the “Risk Factors” section of IonQ's filings with the U.S. Securities and Exchange Commission, including but not limited to the Company's most recent Annual Report on Form 10-K and reports on Form 10-Q. These filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. Forward-looking statements speak only as of the date they are made. Readers are cautioned not to put undue reliance on forward-looking statements, and IonQ assumes no obligation and does not intend to update or revise these forward-looking statements, whether as a result of new information, future events, or otherwise. IonQ does not give any assurance that it will achieve its expectations. IonQ may or may not choose to practice or otherwise use the inventions described in the issued patents in the future.

Table of Contents

IONQ

Our Goal:

To Lead the Quantum Revolution Technologically and Commercially

01

Market Opportunity

Quantum Computing and Networking Expected to Create Up to $880B in Economic Value by 2040

Machine Learning	Optimization	Simulation	Cryptography	Communication
Automotive: AV AI Algorithms **$1B-$10B**	**Logistics:** Network Optimization **$50B-$100B**	**Pharma:** Drug Discovery **$40B-$80B**	**Government:** Encryption, Decryption (Cyber Security) **$20B-$40B**	Security, Networks, and Services **$24B-$36B**
		Aerospace: CFD **$10B-$20B**		
Finance: AML and Anti-fraud **$20B-$30B**	**Insurance:** Risk Management **$10B-$20B**	**Chemistry:** Catalyst Design **$20B-$50B**		
Tech: Search/Ads Optimization **$50B-$100B**	**Finance:** Portfolio Optimization **$20B-$50B**	**Energy:** Solar Conversion **$10B-$30B**	**Corporate:** Encryption (Cyber Security) **$20B-$40B**	
		Finance: Market Simulation **$20B-$35B**		
Other Use Cases **$25B-$110B**	**Aerospace:** Route Optimization **$20B-$50B**	Other Use Cases **$75B-$115B**		

Quantum machine learning applications to impact most, if not all, industries

Sources: BCG, The Long-Term Forecast for Quantum Computing Still Looks Bright, June 2024, McKinsey, Quantum Technology Monitor, April 2024
Note: Value creation market sizes estimated at technology maturity

IonQ Leads the Pack in Quantum Technology

The LEADER in Quantum Computing and Quantum Networking

Rapidly Expanding Global Footprint across **5 Countries**

Built for Today's **Modern Data Centers**

Roadmap: **2M Qubits/ 80K Logical Qubits** by 2030

Trapped Ion Architecture with **High Fidelity and Connectivity**

Exceedingly Low **13:1** Error Correction Overhead

Every **Major Cloud and SDK** Supported

100-Qubit System in 2025

IonQ Leads the Pack in Commercialization

HYUNDAI **AFRL** **aws** **DARPA**

Hundreds of Premier Global Partners & Customers

$87B

TAMs By 2035[1]

Large and Growing Market Opportunity

Microsoft Azure **aws** **Google Cloud**

Only Quantum Hardware Available on All Major Clouds

$1.6B

Cash, Cash Equivalents, and Investments Balance[2]

Capitalized to Execute and Deliver

Thriving Global Quantum Hubs

1,000+

Patent Portfolio[3]

20+ Years of Technology Development

$82M-$100M

Expected FY25 Revenue

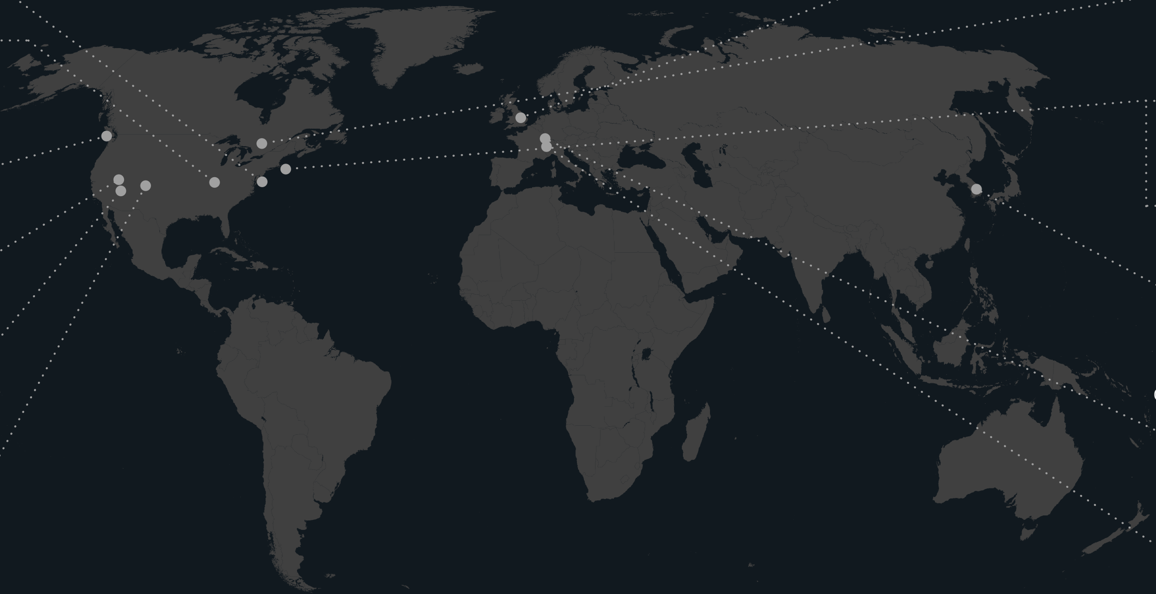
Exceptional Track Record of Revenue Growth

Exceptional Quantum Application Portfolio

1. McKinsey Quantum Technology Monitor, Quantum computing and Quantum communication markets, April 2024
2. Cash, cash equivalents and investments were $697.1M as of March 31, 2025
3. Includes owned or controlled patents granted and pending as of May 2025, including those from IDQ (in which IonQ owns a majority stake), Lightsynq Technologies, and Oxford Ionics (which IonQ intends to acquire pending closure pursuant to terms signed in June 2025)

Expanding **Global** Footprint

The world's greatest quantum talent works at IonQ



Boston, MA, USA
Acquired Lightsynq in **May 2025**

Chattanooga, TN, USA
Acquired Qubitekk in **Dec 2024**

Seattle, WA, USA
Opened manufacturing facility in **June 2023**

San Francisco, CA, USA
Acquired Capella in **July 2025**

Vista, CA, USA
Acquired Qubitekk in **Dec 2024**

Louisville, CO, USA
Acquired Capella in **July 2025**

Oxford, England
Pending acquisition of Oxford Ionics signed in **June 2025**

Toronto, Canada
Acquired Entangled Networks in **Jan 2023**

Washington DC, USA
Acquired Capella in **July 2025**

College Park, MD, USA
IonQ Headquarters since **2015**

Seoul, South Korea
Acquired majority stake of ID Quantique in **April 2025**

Basel, Switzerland
Quantum data center through partnership with QuantumBasel in **July 2023**

Geneva, Switzerland
Acquired majority stake of ID Quantique in **April 2025**

Led by Distinguished Industry Veterans

Niccolo de Masi
Chairman & CEO
dMY Technology Group | Glu | Siemens Genius Sports | Resideo | Planet

Thomas Kramer
Chief Financial Officer
Oracle | Cvent | BCG | Accenture

Jordan Shapiro
President & GM, Networking
NEA | Samsung

Margaret Arakawa
Chief Marketing Officer
Microsoft | Intel | Fastly

Rima Alameddine
Chief Revenue Officer
Nvidia | Cisco | Sun Microsystems

Paul Dacier
Chief Legal Officer
EMC | AerCap Holdings | Quinn Emanuel

Tom Jones
Chief People Officer
Microsoft | Honeywell | Blue Origin

Ariel Braunstein
SVP, Product
Google | Cisco

David Mehuys
VP, Production Engineering
PsiQuantum | Infinera

Chris Monroe
Chief Scientific Advisor & Co-Founder
Duke University | NIST University of Maryland

Rick Muller
VP, Quantum Systems
IARPA | Sandia National Labs

Dean Kassmann
SVP, Engineering & Technology
Amazon | Blue Origin

Marco Pistoia
SVP, Industry Relations
IBM | JP Morgan Chase

Martin Roetteler
VP, Quantum Solutions
Microsoft | NEC

Integrating World-Class Talent & Technology

Computing Acquisitions	Technology Acceleration	Scientific Leadership
oxford ionics*	Oxford Ionics technology provides more qubits per QPU at lower cost, without compromising on performance.	 **Dr. Chris Ballance** CEO, Oxford Ionics • Intention to be acquired by IonQ June 2025 (2019 - 2025) • Fellow, University of Oxford (2019 - 2025) • PhD, University of Oxford (2010 - 2014) • Citations: 4,475 • h-index: 25
LIGHTSYNQ	Lightsynq's interconnect solution provides faster connections between QPU's, allowing for cost-effective data center scale-out.	 **Dr. Mihir Bhaskar** CEO, Lightsynq Technologies • Acquired by IonQ (2024 - 2025) • Research Lead, AWS Center for Quantum Networking (2021 - 2024) • PhD, Harvard University (2015 - 2021) • Citations: 5,085

*Announced intent to acquire Oxford Ionics on June 9, 2025

Customers and Partners

Select Customers

HYUNDAI
AIRBUS
Oak Ridge National Laboratory
Google Cloud
QuantumBasel
DARPA
AFRL
GE Research
Thompson CAT
einride
Amazon Braket
ARLIS
General Dynamics
AIST
epb Quantum
Microsoft Azure
University of Maryland
SQC South Carolina Quantum
Sungkyunkwan University
DESY.

Customers and Partners

Select Partners

NVIDIA

Microsoft Azure

LOCKHEED MARTIN

Google Cloud

DELL

Amazon Braket

TOYOTA TSUSHO

Pacific Northwest NATIONAL LABORATORY

AIST

Intellian

AstraZeneca

Ansys

GENERAL DYNAMICS

Q-CTRL

KiSTi www.kisti.re.kr

DARPA

GDIT

einride

imec

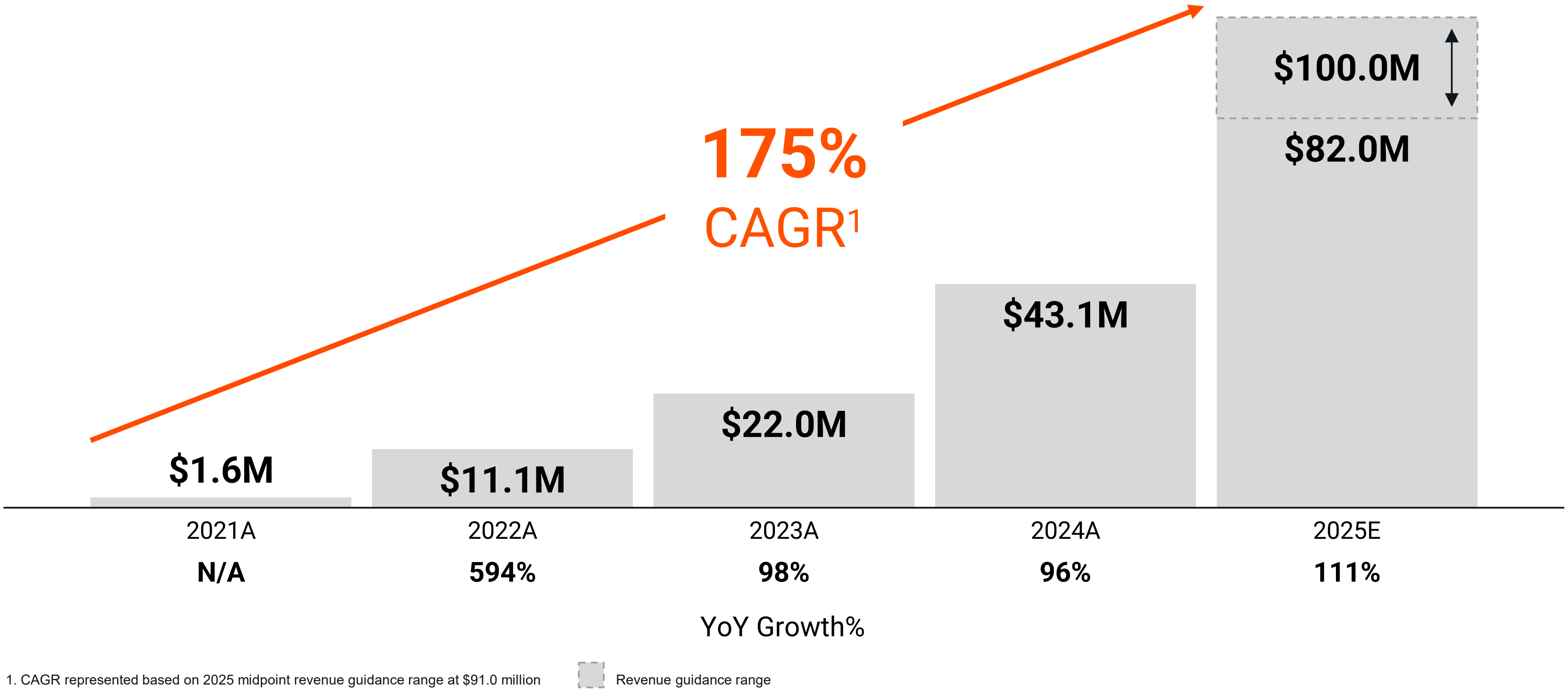
NKT Photonics

02

Leading the Quantum Industry

Accelerating GAAP Revenue

IonQ has been approximately doubling GAAP Revenue YoY since joining NYSE



1. CAGR represented based on 2025 midpoint revenue guidance range at $91.0 million

Large and Growing
Intellectual Property Portfolio

	Granted	Pending
IONQ	**214**	**339**
IDQ	229	69
Qubitekk	116	2
LIGHTSYNQ	10	18
oxford ionics	4	59

Total IonQ

1,060*

*Includes owned or controlled patents granted and pending as of May 2025, including those from IDQ (in which IonQ owns a majority stake), and Oxford Ionics (which IonQ intends to acquire pending closure pursuant to terms signed in June 2025).

Leading Quantum Computing Technology Roadmap

IONQ

	2025	2026	2027	2028	2029	2030
Qubits	64-100+	100-256+	10,000	20,000	200,000	2,000,000
Logical Qubits		12	800	1,600	8,000	80,000
Logical Error Rates		<1.00E-7			<1.00E-12	

Integration of Oxford Ionics trap technologies

Real Qubits, Real Results

Numbers and track record demonstrate IonQ's leading position in the Quantum race

	IONQ	Superconducting	Annealing	Other Compute Modalities
Price				
BOM Cost Est. at Full Fault Tolerance	**<$50M per Machine**	>$1B per Machine	N/A (No Fault Tolerance)	>$1B per Machine
Performance				
Fidelity	**99.9999999% by 2029**	99.9%	No Gates	Varies
Error Correction Ratio	**13 : 1**	1,000 : 1	No Gates	10,000 – 1,000,000 : 1
Scale				
Space Requirements (Fault-Tolerant)	**Data Center Racks**	Football Field	Football Field	Football Field
Energy Requirements	**Wall Socket**	Nuclear Reactor	Unclear	Nuclear Reactor
Cooling Requirements	**Minimal**	Refrigeration	Refrigeration	Usually
Logical Qubits in 2027 / 2030	**800 / 80,000**	100 / 1,000	No Gates	None / 100
Enterprise Grade				
Applications	**Proven and Published**	Not Disclosed	Specific Use-Case	None
Public Cloud Availability	**Big 3 Since 2021**	Select Providers	Select Providers	None
Manufacturing Scale	**Multiple Deployments**	Multiple Deployments	Limited Deployments	Early R&D Stage

Delivering the Most Powerful Quantum Computers in the World

	2025	2026	2027	2028	2029	2030
Physical Qubits						
IonQ	**64-100+**	**100-256+**	**10,000**	**20,000**	**200,000**	**2,000,000**
IBM	133	360	1080	1080	n/a	n/a
Rigetti	36	100	n/a	n/a	n/a	n/a
Quantinuum	96	n/a	192	n/a	1,000+	n/a
Logical Qubits						
IonQ		**12**	**800**	**1,600**	**8,000**	**80,000**
IBM		n/a	n/a	n/a	200	200+
Quantinuum	~50	n/a	~100	n/a	100’s	n/a
Logical Error Rates						
IonQ		**<1.00E-7**	**<1.00E-7**	**<1.00E-7**	**<1.00E-12**	**<1.00E-12**
IBM	Not disclosed	n/a	n/a	n/a	n/a	n/a
Quantinuum	<1.00E-4	n/a	~1.00E-5	n/a	1.00E-5 to 1.00E-10	n/a

Source: Public roadmaps

03

Technology Path to Commercial Advantage

Performance

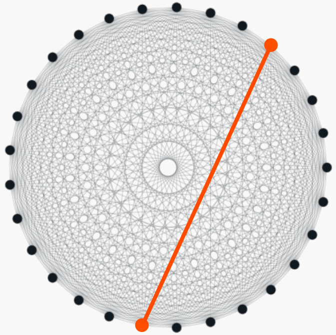
Trapped Ion Architecture

	Trapped Ion	Superconducting
Fidelity	▲ 99.99%+	▼ Varies
Connectivity	▲ All-to-all[1]	▼ Nearest neighbor (requires more 2Q Gate operations)
Error Correction	▲ 3:1 partial error correction[2] ▲ 13:1 error correction[3]	▼ 100:1 error correction[4]
Scalability	▲ Natural and identical ▲ Data center configurable ▲ Electronic chip manufacturing	▼ Manufactured ▼ Large and clunky ▼ Refrigeration required
Coherence	▲ Longest qubit lifetime	▼ Shorter qubit lifetime
Temperature	▲ Room temperature environment	▼ Dilution refrigerator cooled to 10 millikelvin

IONQ

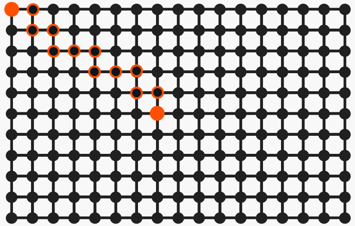
IonQ Advantage

All-to-all connectivity[1]
Two-qubit gate fidelity



Superconducting Competitors

Nearest-neighbor connectivity
Multiple swap gates required



1. All-to-all connectivity for ions within the same QPU core (laser gates core)
2. Partial error correction through Clifford Noise Reduction (CliNR)
3. Error correction rates for IonQ trapped ion quantum computers; refer to arXiv:2503.22071
4. Using the [[49,1,7]] surface codes instead of the [[48,4,7]] BB5 codes

Electronic Qubit Control:

Scaling, Fidelity, Speed, and Precision

Control

Microwaves and electric fields enable precise, localized qubit control for maximum accuracy

Speed

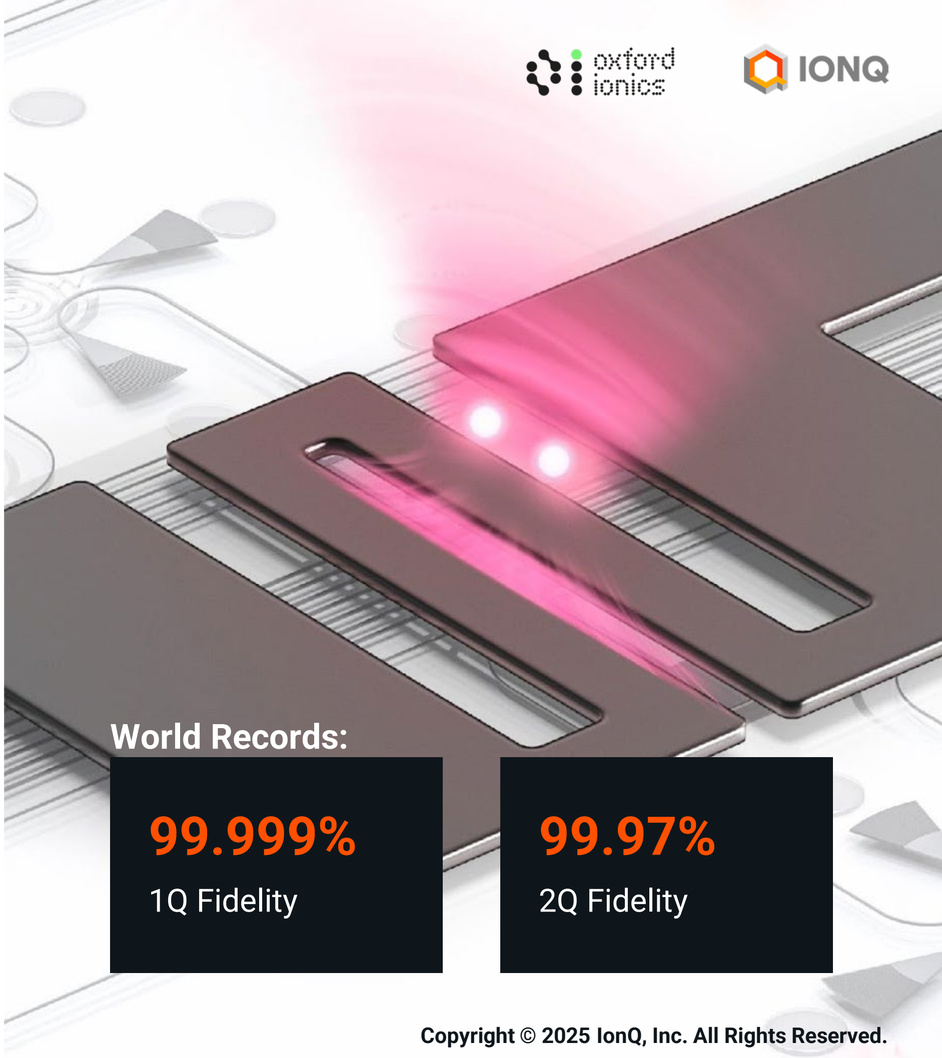
On-chip control and parallel ops boost efficiency and reduce time-to-solution

Fidelity

Strong on-chip isolation enables longer coherence and industry-leading fidelity

Scalability

Qubit-dense, replicable chips lower cost per qubit and overcome scaling and manufacturing limits



World Records:

99.999%
1Q Fidelity

99.97%
2Q Fidelity

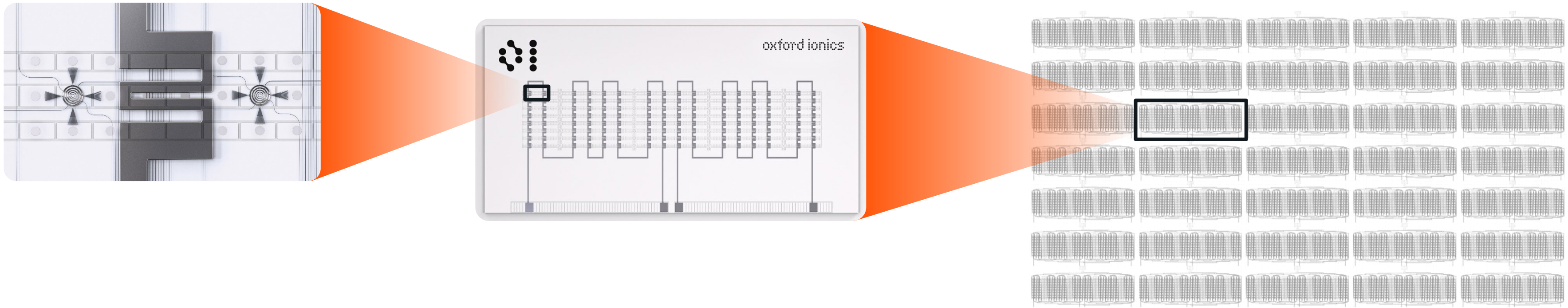
Scale

IonQ and Oxford Ionics Roadmap Increases Qubit Density on Chip

8-qubit
unit cell

256-qubit
quantum computer

10,000-qubit
quantum computer

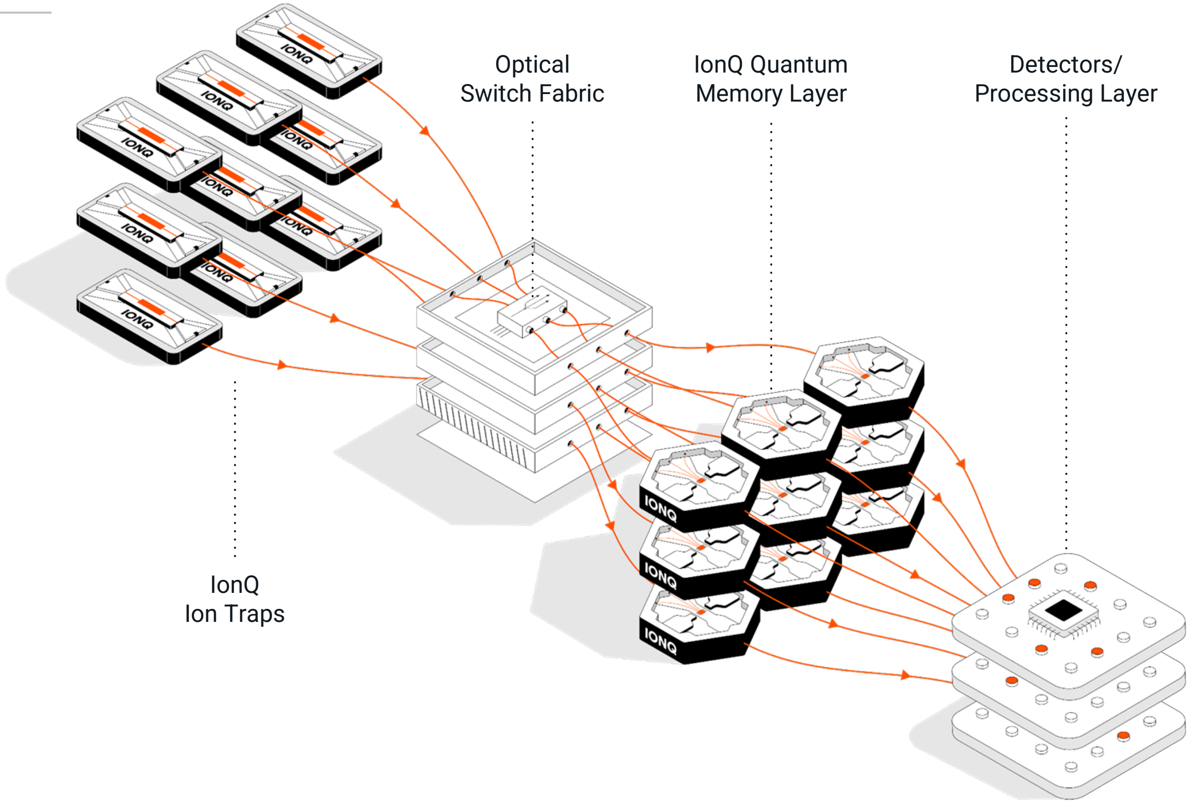


Acquisition of Oxford Ionics **creates a path for scaling qubit count** through manufacturing on standard silicon chips

Scale

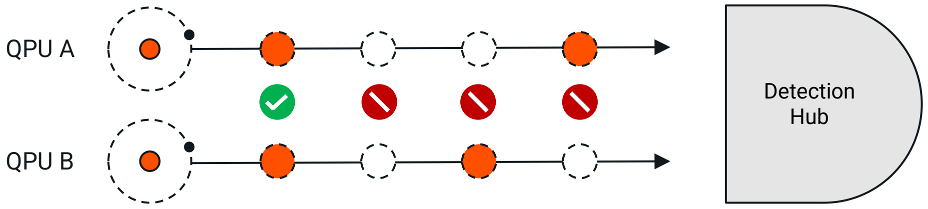
Photonic Interconnects Drive Modular Scaling

Data center-friendly scaling architecture leveraging mature optical fiber link technology



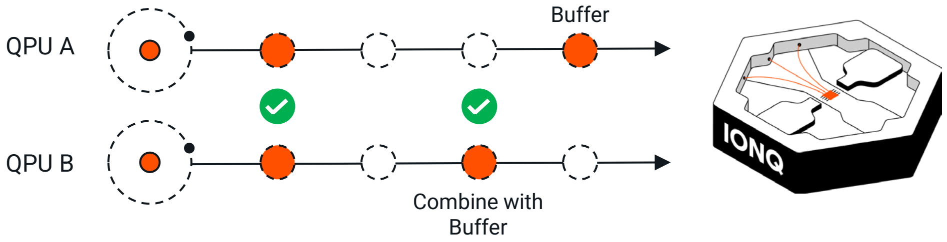
Quantum Memory Enhanced Photonic Interconnects

Previous best-in-class: No quantum memory



- Simultaneous photon arrival required for connection
- Photon loss causes retries, reducing network speed

IonQ Lightsynq approach: Memory-enhanced interconnects



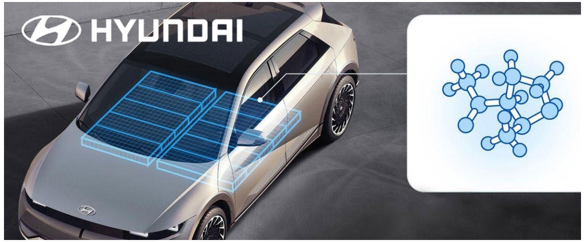
- No sync needed with quantum memory
- Memory mitigates loss, enabling up to 50× faster networks
- Integrated photonics allow scalable, foundry-ready chips

04

Enterprise-Grade Applications & Ecosystem

Leading Sustainability and Environment Innovation

Innovative Use Cases Positively Impacting Climate Initiatives

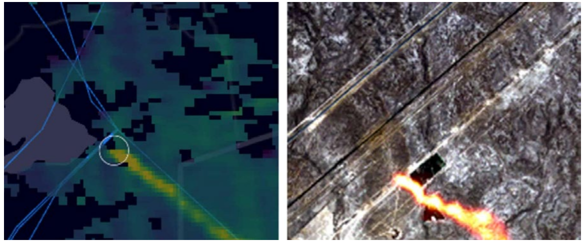


Battery Material Simulation

Power Grid Balancing and Optimization

Electric Transport Logistics Optimization

Photovoltaic Modeling and Design



Gas Leak Detection Via Satellite

Carbon Sequestration Catalysts

Applications for **Commercial Advantage**

IONQ

Optimization

OAK RIDGE National Laboratory

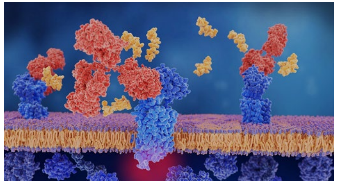
Energy Grid Distribution Improvements

- Developing novel hybrid algorithms to solve energy optimization problems
- Accelerating grid modernization and optimizing power generation schedules to meet electricity demand at minimal cost

Potential Market Size:
$50B-$100B

Drug Discovery

AstraZeneca



Pharma Drug Discovery Modeling

- Using quantum to advance chemical interactions modeling for drug discovery
- 20x faster time-to-solution than best previously published implementation with higher accuracy and lower power consumption

Potential Market Size:
$40B-$80B

Simulation

Ansys

Engineering Simulation Modeling

- Integration of quantum solutions into design tools
- Demonstrated 12% commercial advantage over classical alternatives on life-saving blood pump computational engineering

Potential Market Size:
$10B-$20B

Data Analysis

GDIT

Fraud & Anomaly Detection in Large Datasets

- Creating quantum solutions enhancing fraud and anomaly detection in large datasets
- Project focused on identifying complex irregularities with greater accuracy

Potential Market Size:
$25B+

Optimization

AIRBUS

Supply Chain Optimization

- Developing quantum algorithms for optimizing cargo loading
- Increasing operational efficiency to drive fuel and labor cost savings

Potential Market Size:
$50B-$100B

Source: BCG, The Long-Term Forecast for Quantum Computing Still Looks Bright, June 2024
Note: Value creation market sizes estimated at technology maturity

Quantum-Accelerated Graph Partitioning for Finite Element Simulation with Ansys

Business and Technical Challenges

LS-DYNA crash simulations are slowed by costly graph partitioning on massive FEM meshes

IonQ's Quantum Solution

QITE approach breaks down large meshes into smaller subgraphs for quantum processing

Business Impact

Up to 12% faster simulation times, with strong potential for continued quantum-driven acceleration

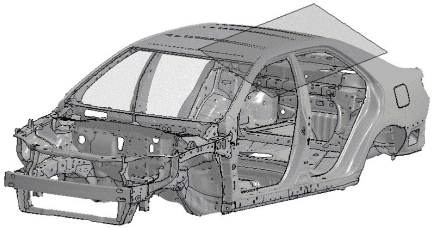
Up to

12%

Improvement over classical heuristics

2.6M vertices

40M edges



Accelerating Drug Development through Enhanced Simulations with AstraZeneca

Business and Technical Challenges

Traditional computing struggles to accurately and efficiently model complex transition metal catalysis

IonQ's Quantum Solution

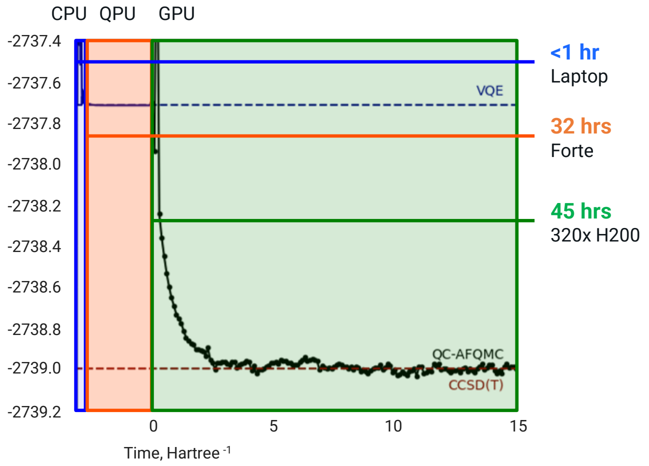
QC-AFQMC delivers scalable, high-accuracy simulation of reaction energetics

Business Impact

Enables faster, more cost-effective drug development and material design

20x

Faster time-to-solution than best previously published implementation



Accelerating Value:

Expanding the Quantum Application Opportunity

Apps Market Opportunity

2024
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

2025
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

2026
- Laminar Fluid Dynamics
- Vehicle Routing
- Image Change Detection
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

2027
- Drug-Target Affinity Prediction With Solvent Model
- Fantasy Sports Team Picking
- AI Agent Assignment
- Laminar Fluid Dynamics
- Vehicle Routing
- Image Change Detection
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

2028
- Institutional Portfolio Rebalancing
- Pharma Catalysts Redesign
- Battery Materials Discovery
- Medical Imaging Analysis
- Drug-Target Affinity Prediction With Solvent Model
- Fantasy Sports Team Picking
- AI Agent Assignment
- Laminar Fluid Dynamics
- Vehicle Routing
- Image Change Detection
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

2029
- Training Robotic AI Models
- Quantum Federated Learning
- Optimization Of AI Agent Action Planning
- Materials Discovery For Advanced Medical Equipment
- Carbon Capture Catalyst
- Polymorph Screening for Drug Discovery
- Institutional Portfolio Rebalancing
- Pharma Catalysts Redesign
- Battery Materials Discovery
- Medical Imaging Analysis
- Drug-Target Affinity Prediction With Solvent Model
- Fantasy Sports Team Picking
- AI Agent Assignment
- Laminar Fluid Dynamics
- Vehicle Routing
- Image Change Detection
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

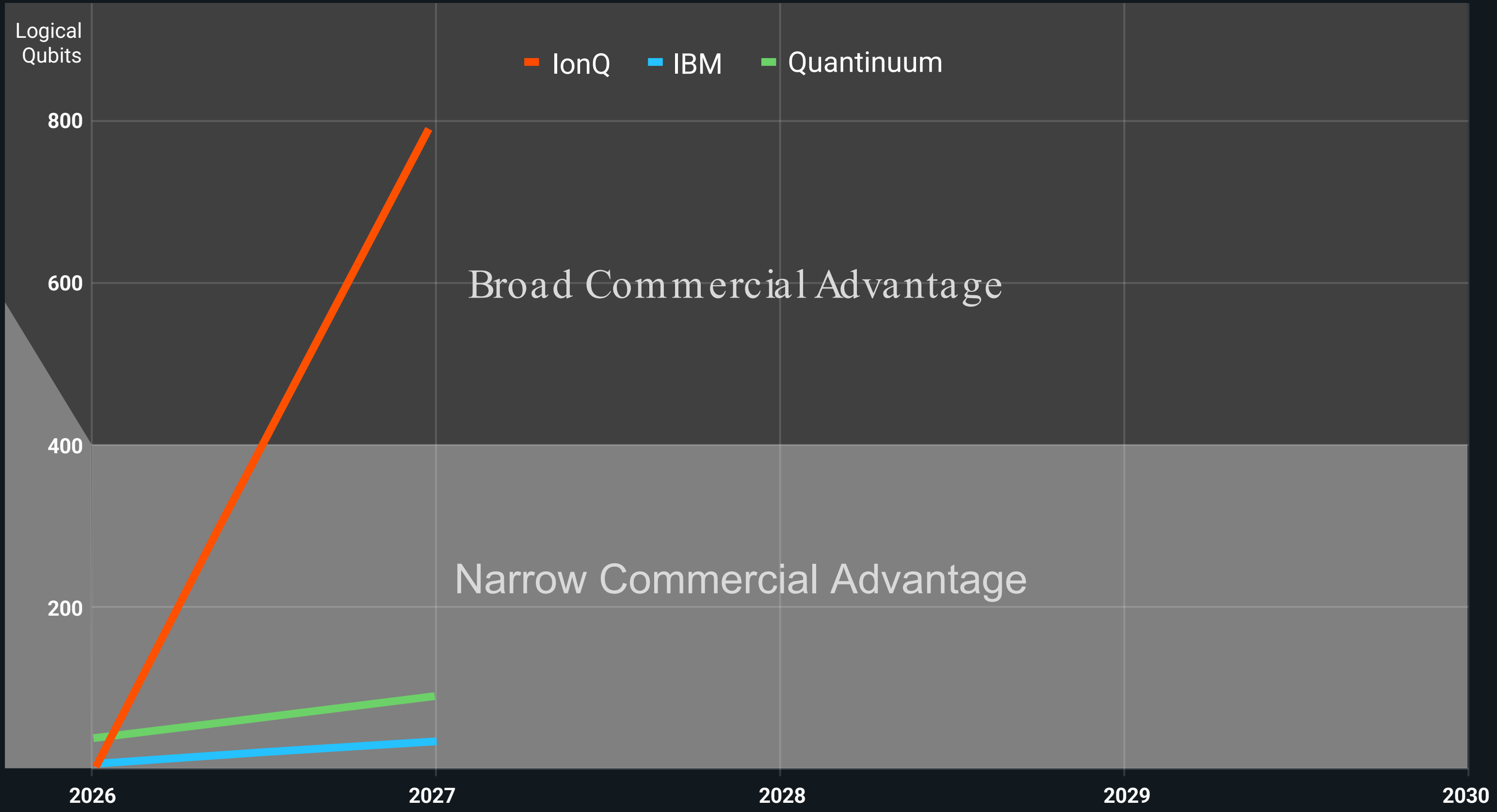
2030
Broad Commercial Advantage
- Training Robotic AI Models
- Quantum Federated Learning
- Optimization Of AI Agent Action Planning
- Materials Discovery For Advanced Medical Equipment
- Carbon Capture Catalyst
- Polymorph Screening for Drug Discovery
- Institutional Portfolio Rebalancing
- Pharma Catalysts Redesign
- Battery Materials Discovery
- Medical Imaging Analysis
- Drug-Target Affinity Prediction With Solvent Model
- Fantasy Sports Team Picking
- AI Agent Assignment
- Laminar Fluid Dynamics
- Vehicle Routing
- Image Change Detection
- Protein Folding For Drug Discovery
- Unit Commitment In Electric
- LLM Fine-Tuning
- Chemical Reaction Modeling
- Structural Analysis in CAE
- Synthetic Data Generation

Leading the Pack: Unlocking Broad Commercial Advantage

Applications Unlocked

100 to 800 Logical Qubits

- Satellite change detection
- Small-scale drug affinity
- Fantasy sports picking
- Multi-agent assignment
- Augmented health data
- CFD
- Quantum fine-tuning AI
- Quantum FL for genomics
- Multimodal AI reasoning
- Augmented robotic AI



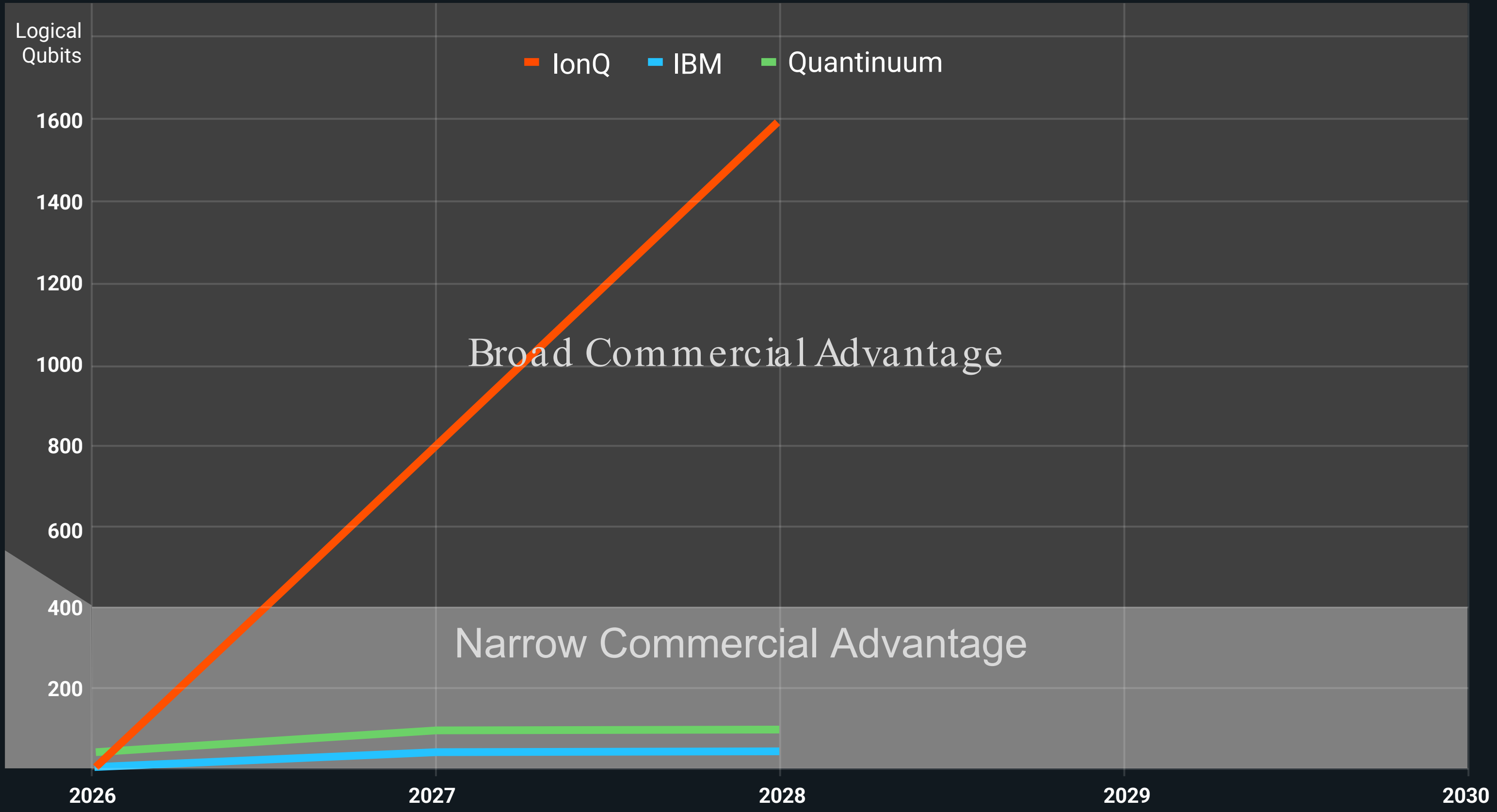
Note: Figures derived from publicly available roadmaps from IBM and Quantinuum, with reasonable approximations used where data was unavailable.

Exponential Edge: Rapid Qubit Scaling Unlocks More Complex Applications

800 to 1600 Logical Qubits

Applications Unlocked

- Fert catalyst redesign
- Clinical toxicity prediction
- AI robotic navigation
- Finite element vibrations
- Portfolio rebalancing
- Perovskite solar cells
- Ion transport in batteries



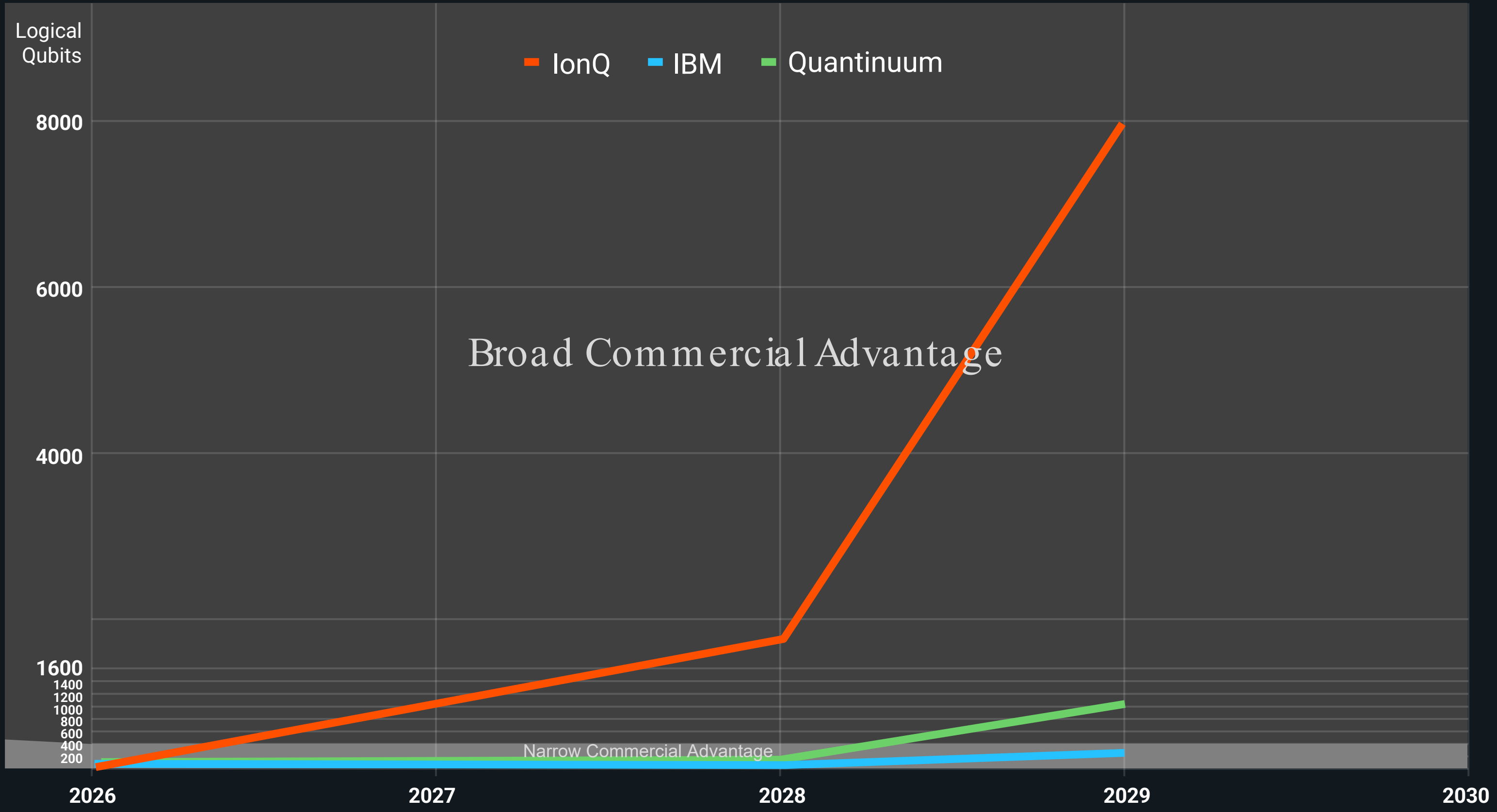
Note: Figures derived from publicly available roadmaps from IBM and Quantinuum, with reasonable approximations used where data was unavailable.

Dominating the Quantum Frontier: Targeting Mission-Critical Applications

1600 to 8000 Logical Qubits

Applications Unlocked

- Brain imaging (HTS)
- Shor's algo - blockchain
- Shor's algo - RSA
- Zeolite oil refining
- Hydrogen fuel cells
- Carbon capture - Ru cycle
- Alzheimer's diagnostics
- Chip placement & routing
- Polymorph screening
- Metal catalyst redesign
- AI agent action planning



Note: Figures derived from publicly available roadmaps from IBM and Quantinuum, with reasonable approximations used where data was unavailable.

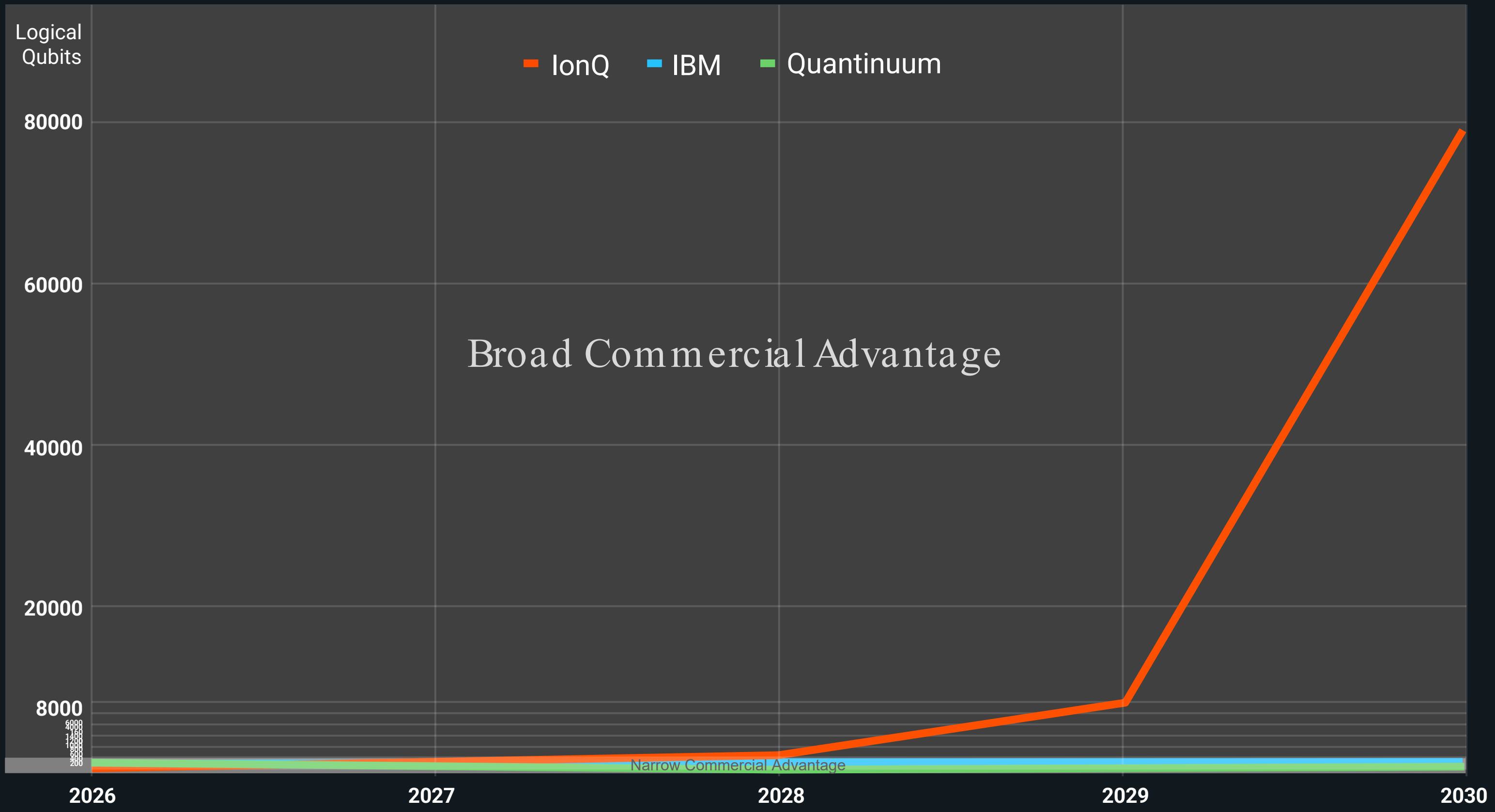
The Platform of Record: Powering the World with Quantum

IONQ

100 to 80000+ Logical Qubits

Applications Unlocked

- Modern electrical grid
- Brain imaging (HTS)
- Shor's algo - blockchain
- Shor's algo - RSA
- Zeolite oil refining
- Hydrogen fuel cells
- Carbon capture - Ru cycle
- Alzheimer's diagnostics
- Chip placement & routing
- Drug polymorph screening
- Metal catalyst redesign
- AI agent action planning
- Fertilizer catalyst redesign
- Clinical toxicity prediction
- AI robotic navigation
- Finite element vibrations
- Portfolio rebalancing
- Perovskite solar cells
- Ion transport in batteries
- Satellite change detection
- Small-scale drug affinity
- Fantasy sports picking
- Multi-agent assignment
- Augmented health data
- CFD
- Quantum fine-tuning AI
- Quantum FL for genomics
- Multimodal AI reasoning
- Augmented robotic AI data



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05

Building the Quantum Internet

The Quantum Internet:
A New Paradigm for Security and Computation

The intersection of best-in-class secure communication and scalable quantum power

The Quantum Internet

Ultra-Secure Communications

Entanglement Distribution and QKD

- Communicate securely, low risk of hacking from quantum computers
- Ultra-secure communication, even in remote, highly-sensitive settings

Ultra-Secure Computation

Blind Quantum Computing

- Securely run algorithms, even on centralized hardware
- Eliminate threats of compromised privacy and integrity of compute

Networked Compute

Modular, Scalable Quantum

- Achieve more powerful quantum systems by linking computers
- Compute across modalities for a diverse array of algorithms

Quantum Networking Solutions for Post Quantum Cryptography

Problem: The RSA Vulnerability

For decades RSA public key cryptography has been the foundation of secure communications

Implementation flaws such as poor random number generation, side-channel attacks, and padding oracle attacks create security exposure

Threats of data harvest now, decrypt later is a material risk to global organizations

Shor's algorithm and exponentially powerful quantum computers threaten the security and data protection that RSA currently offers

Leading the Race to Resilience

Solution: IonQ's Quantum Networking

Quantum Security

Quantum key distribution

Entanglement Distribution

Enabling secure compute and communications

Quantum Componentry

Photon detection systems for long-range quantum optical networks

Telecom, banks and institutions spearheading the quantum-safe security revolution

QKD is easily integrated on top of existing encryption protocols

Enabling Commercial-Scale Quantum Networks

Entangled photon sources

Superconducting nanowire detectors

Quantum-compatible fiber optic switches

Precision correlated timing hardware

EPB **Quantum Network**SM

A Commercially Available Quantum Network in Tennessee

EPB Quantum Center is the first commercial quantum computing and networking facility in the U.S.

Enabling Long-Distance, Global Quantum Networks

Quantum repeaters pave the way for the quantum internet backbone

Over **35 km** of deployed fiber with a path to **hundreds of kilometers** between repeaters

Over **one second** storage time

Repeaters are a key component of the **Quantum Internet** future

nature

Article

Entanglement of nanophotonic quantum memory nodes in a telecom network

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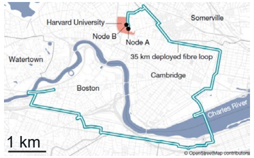


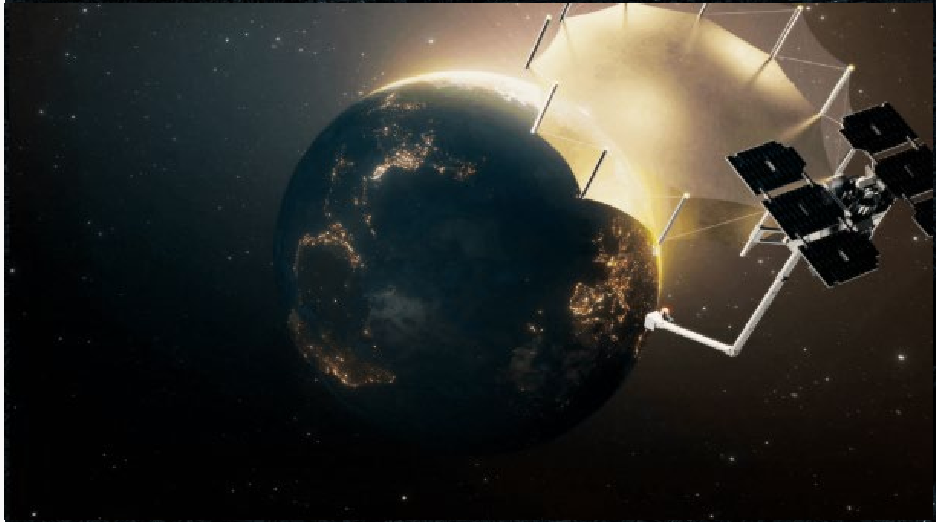
A key challenge in realizing practical quantum networks for long-distance quantum communication involves robust entanglement between quantum memory nodes connected by fibre optical infrastructure[1–3]. Here we demonstrate a two-node quantum network composed of multi-qubit registers based on silicon-vacancy (SiV) centres in nanophotonic diamond cavities integrated with a telecommunication fibre network. Remote entanglement is generated by the cavity-enhanced interactions between the electron spin qubits of the SiVs and optical photons. Serial, heralded spin-photon entangling gate operations with time-bin qubits are used for robust entanglement of separated nodes. Long-lived nuclear spin qubits are used to provide second-long entanglement storage and integrated error detection. By integrating efficient bidirectional quantum frequency conversion of photonic communication qubits to telecommunication frequencies (1,350 nm), we demonstrate the entanglement of two nuclear spin memories through 40 km spools of low-loss fibre and a 35-km long fibre loop deployed in the Boston area urban environment, representing an enabling step towards practical quantum repeaters and large-scale quantum networks.

Global Space-based Quantum Internet Capability

Establishes IonQ as **vertically integrated** orbital sensor network deployment leader

Unlocks **rapidly growing secure communications market** via QKD and free-space optical quantum transmission

Enables direct access to top-secret contracting expertise; IonQ gains a **Facility Security Clearance (FCL)**



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