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Communications Regulatory Authority
State of Qatar

هيئة تنظيم الاتصالات
دولة قطر

2022

ANNUAL REPORT

Defining the Digital Future:
Qatar's Leadership in 5G and Cloud Innovation

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

"In the Name of Allah, the Most Gracious, the Most Merciful."

His Highness
Sheikh Tamim bin Hamad Al Thani
Amir of the State of Qatar

His Highness
Sheikh Hamad bin Khalifa Al Thani
The Father Amir

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Message from the Minister of Communications and Information Technology

Mohammed bin Ali Al Mannai

Dear Esteemed Partners and Colleagues,

Reflecting upon the past year, it is with profound pride and satisfaction that I present the Communications Regulatory Authority's (CRA) achievements in the 2022 Annual Report.

The year 2022 marked a monumental chapter in our nation's history as we hosted the FIFA World Cup Qatar 2022™. This prestigious event was a testament to Qatar's commendable hospitality, organizational prowess, and technological readiness, all of which were instrumental in the successful execution of this global spectacle.

Earlier in the year, we won the bid to host the International Telecommunication Union Plenipotentiary Conference (ITU-PP) in 2026. This victory highlights the global community's confidence in Qatar's digital capabilities and offers us a further opportunity to showcase our technological advancements on the world stage. We look forward to working with world leaders in ICT to connect the unconnected and ensure universal access to digital services.

I must commend the outstanding teamwork demonstrated by our technology partners and providers this year. Their diligent planning and testing ensured seamless service delivery during critical times, demonstrating the resilience and robustness of our digital infrastructure.

Special recognition goes to our CRA Spectrum team for their extraordinary work. Their ceaseless efforts have ensured optimal utilization of our spectrum resources, laying the groundwork for the deployment of state-of-the-art technologies, as well as exceptional efficiency in approving all equipment, ensuring they meet our stringent standards and are safe for consumer use.

In a significant stride towards bolstering our digital infrastructure, Microsoft inaugurated an Azure cloud region in Qatar. This landmark project has the potential to create around 36,000 jobs in Qatar over the next four years — transforming it into a digital hub for the region and the world. Local players also continue to contribute to the expansion of the cloud market in Qatar, underlined by the expected IPO of MEEZA, which is anticipated to be listed on the QSE by mid-2023.

Alongside this, we signed an agreement with Google Cloud to provide services to government entities - following on from the training that Google has already provided to 4,100 participants in Qatar over the past years. These partnerships reaffirm our commitment to harnessing world-class technology to transform public services, enhance efficiency, develop talent, and stimulate innovation.

We are pleased to announce the issue of a new license for Starlink in Qatar, reflecting our commitment to nurturing a robust digital ecosystem. This move enhances the array of choices available to consumers and businesses, fostering a competitive and innovative market.

In 2022 we conducted an ICT sector study to address the data and information gap in the industry, focusing on the Information Technology sub-sector. We have published a classification document to provide stakeholders with principles, definitions, and sector-specific categorization, which will be officially recognized as a national ICT sector-specific classification and undergo regular reviews in the future.

We remain proactive in our digital regulation approach, acknowledging that there is no one-size-fits-all solution for digital policy-making and regulatory framework development. As we and other regional countries develop AI strategies, ethical AI has become a key focus for our policymakers and regulators.

While we've made significant progress in the telecom domain in previous years, our focus is now centered on information technology. With a focus on the regulatory aspects of emerging technologies, we are committed to ensuring access and maintaining competitiveness. We continue to fortify our infrastructure, drive growth and spur innovation, not only to bolster Qatar's current position but to ensure the country is ready for the future.

In conclusion, I extend my deepest appreciation to our dedicated team, stakeholders, and partners for their unwavering commitment and contributions. Together, we have transformed the challenges of the year into opportunities and achievements.

As we look to the future, we remain committed to propelling Qatar's digital landscape forward and fostering a connected and inclusive society.

Best regards,

Mohammed bin Ali Al-Mannai
Minister, Ministry of Communications
and Information Technology

01 Overview of the CRA

CRA FIFA World Cup 2022™ Team

لحماية المستهلك وتعزيز المنافسة

Protecting Consumers & Promoting Competition

Vision for Qatar

A smart and connected nation, enabled by effective and innovative ICT, telecom, digital media and postal regulation.

Mission

To enable the development of a digital society and the postal sector for the social and economic benefit of Qatar, through a forward-looking, transparent and consistent regulatory framework.

To foster sustainable competition to promote a fair marketplace and improve customer experience through the ubiquitous availability of smart, innovative and high-quality services.

To continue building our institutional capabilities through investing in and developing our staff, expertise and resources.

Mandate

"The CRA shall regulate the communications and information technology sector, the post sector, and access to digital media." Emiri Decree No. 42 of 2014.

Our Values

Integrity

We act honestly and build working relationships based on trust and transparency.

Respect

We treat people with care and dignity, empowering them to contribute their best work.

Accountability

We take individual responsibility for the consistency and quality of our work.

Sustainability

We consider the impact of our actions on the local and global environment.

Impact

Proportionate
Accountable
Consistent
Transparent

Our Focus

Our current focus is to facilitate economic diversification and greater innovation and investment in ICT — in order to enhance the competitiveness and attractiveness of the State of Qatar as a regional hub for global technology and communications services.

Over the past decade, the CRA has successfully created a strong framework to support the establishment of Qatar's world-leading telecommunications infrastructure. Now, our focus has shifted to the ICT sector as a key enabler of digital growth.

We are committed to enabling a business-friendly ecosystem within the IT, Telecom, Digital Media, and Postal sectors which will support the continued transformation of Qatar into a world-leading digital economy.

We achieve these objectives by maintaining a regulatory framework that supports the implementation, monitoring, and enforcement of communications, competition, and consumer protection laws.

Our Remit

As the sector regulator in Qatar, the remit of the CRA is to promote and support open and competitive ICT, Telecom, Digital Media, and Postal sectors — providing advanced, innovative, and reliable communications services. This requires us to balance consumer rights and the needs of service providers within the context of the national strategy.

Our Duties

To make world-class communications and technology services available to our citizens, residents, and businesses.

To ensure the efficient and effective use of national resources, especially the radio spectrum.

To protect our citizens and residents from invasions of privacy, offensive content, unfair treatment, and harmful activities.

To develop a framework that secures a universal service obligation for postal services in Qatar.

2022: Year at a Glance

Overview

Qatar showed strong economic performance in 2022 as the economy grew at an unprecedented 4.8%. This was driven by a strong Q4, influenced by service sector activities related to the FIFA World Cup Qatar 2022™. Real GDP during Q4 grew at 2.7%, an increase of 8% over the same time period last year.

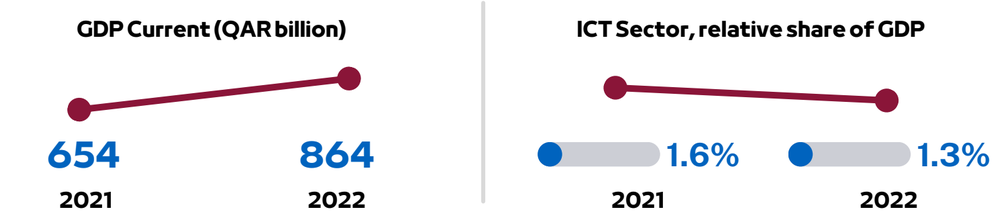
The ICT sector in Qatar contributed to 1.3% of Qatar's GDP in 2022, accounting for QAR 11.5 billion — an increase of 11.4% over the previous year. However, with the overall GDP increasing from 653.7 billion to 863.8 billion — the proportional contribution of the sector to the national GDP fell by 0.3 percentage points.

The sector remains a minor contributor to Qatar's economy but has the potential to be an important source of economic diversification for the country in the future.

The information and communication sector contributed 2.7% to Qatar's real non-hydrocarbon GDP in 2021, a share that has been increasing; this contribution can further grow to GCC and international levels (4.5% - 6.9%) as the nascent IT segment matures.

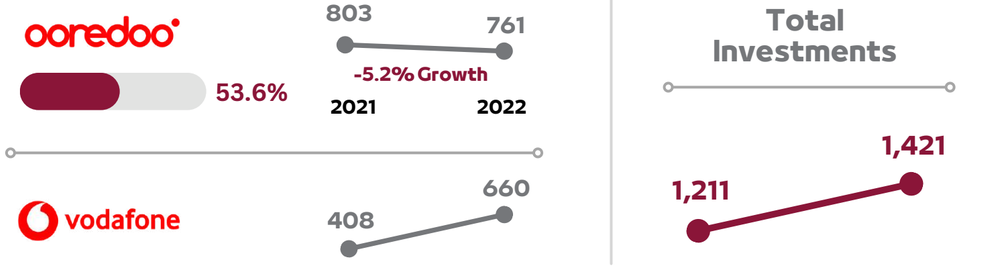
Despite recent growth, however, this share remains smaller than in other GCC states and top ICT economies, where the information and communications industry contributed between ~4% and ~7% of the real GDP in 2021. This indicates that Qatar has room to pursue further sector growth.

Qatar GDP & ICT Sector GDP Contribution



Qatar's technology sector achieved robust growth, again driven by activities related to the preparation for, and hosting of the FIFA World Cup Qatar 2022™ —as well as an increased focus on digitization, most notably among public sector institutions.

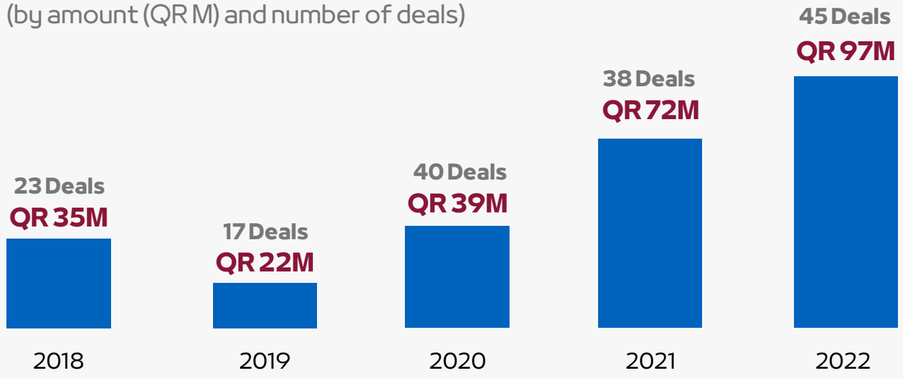
Investments by telecom providers showed growth of over 17% in total year on year, driven principally by Vodafone's increased investment in infrastructure in Qatar, which offset a small drop in inbound investment by Ooredoo over the same period.



Source: CRA

5-year Venture Funding Evolution in Qatar

(by amount (QR M) and number of deals)

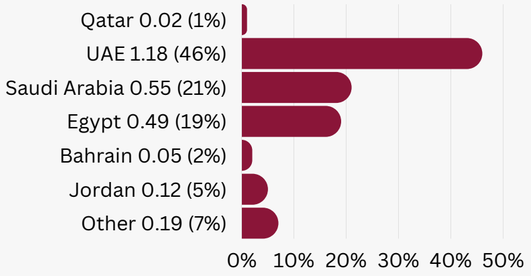


Source: 2022 Magnitt QDB Qatar Venture Investment Report

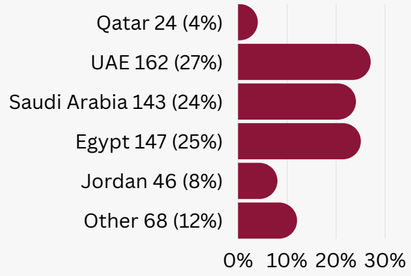
Venture capital funding in Qatar saw a record year in 2022, both in terms of total funding secured and the number of deals. Companies in Qatar raised QAR 97 million (35% growth YoY) across 45 transactions (18% growth YoY).

However, the VC market in Qatar remains smaller than in peer countries, requiring additional development and support to realise its potential.

$2.6bn Total VC **raised** in MENA 2021



590 Total VC **deals** in MENA 2021

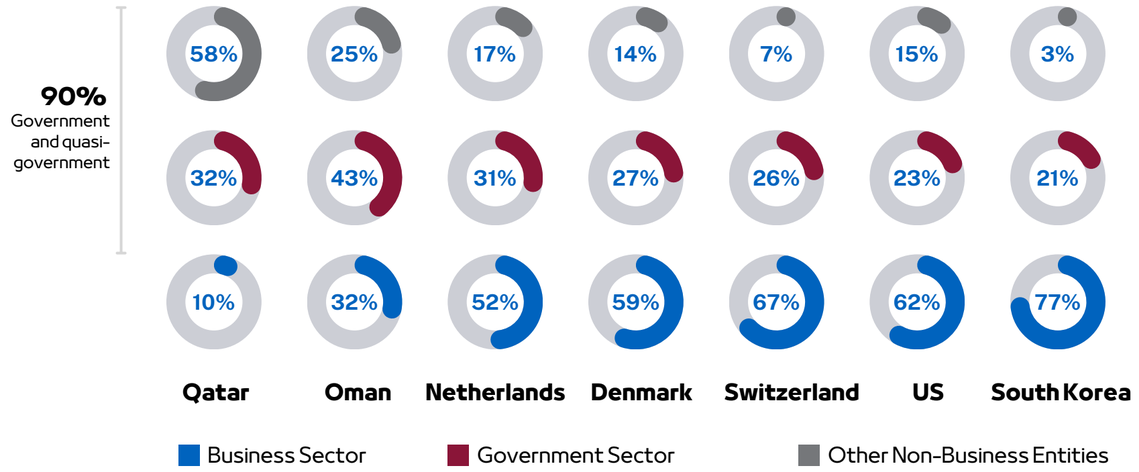


Source: CRA ICT Sector Survey 2022

The International Monetary Fund (IMF) has noted progressive structural reforms in Qatar, all aimed at fulfilling the Qatar National Vision 2030. These reforms particularly focus on green financing and digitalization. The Ministry of Finance has been at the forefront, devising a Sovereign Green Financing Framework, which provides a comprehensive set of principles. Qatar Central Bank (QCB) established a new department responsible for defining ESG policies, creating a standardized reporting framework, and managing ESG risk and compliance. These initiatives, involving primary regulatory bodies, are currently under evaluation at the national level.

Knowledge creation and innovation in Qatar remain driven primarily by government agencies, with limited participation of the private sector in comparison to other global economies.

Gross domestic expenditure in R&D (GERD) by sector contribution (% of total GERD)



Source: CRA ICT Sector Survey 2022

Qatar has successfully leveraged the 2022 FIFA World Cup™ to enhance its digital infrastructure. The Investment Promotion Agency of Qatar has initiated strategic partnerships to expedite digital transformation and stimulate domestic technological innovation, including through Foreign Direct Investment (FDI). Most recently, QCB has unveiled the National Fintech Strategy, for which detailed guidelines and standards are in development.

Ooredoo Qatar and Vodafone Qatar have invested heavily in Qatar's telecom sector with annual CapEx exceeding QAR1 Billion since 2017, while additional market investments in data center capacity, cloud infrastructure, and development of digital services are key to further augmenting the ICT sector and digital economy.

Qatar Global Rankings and Key Metrics

The metrics below show Qatar's ranking for key global indicators related to the technology sector, and the nation's achievement against specific ICT metrics in 2022.

1st Mobile Broadband Speed

3rd Median 5G Download Speed

4th 5G availability by Country

26th Global Digital Competitiveness

40th Fixed Broadband Speed

42nd Global Network Readiness Index (of 131 countries)

42nd Network Readiness Index

Median Download Speed - Mobile
176.18 Mbps

5G Population Coverage
95.7% (Q3 2022)

Mobile Voice Subscriptions
4.5 million (Q3 2022)

Calls Per Subscription per Month
141 minutes (Q3 2022)

Mobile Broadband Penetration
149%

Broadband Subscriptions >30 Mbps
95% (Q3 2022)

Median Upload Speed - Mobile
25.13 Mbps

4G Population Coverage
99.8% (Q3 2022)

Mobile Voice Population Penetration
150% (Q3 2022)

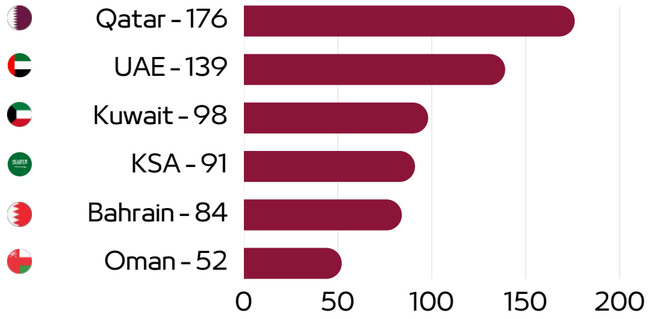
Data Subscriptions
4.4 million (Q3 2022)

Data Use Per Subscription Per Month
11.9 GB

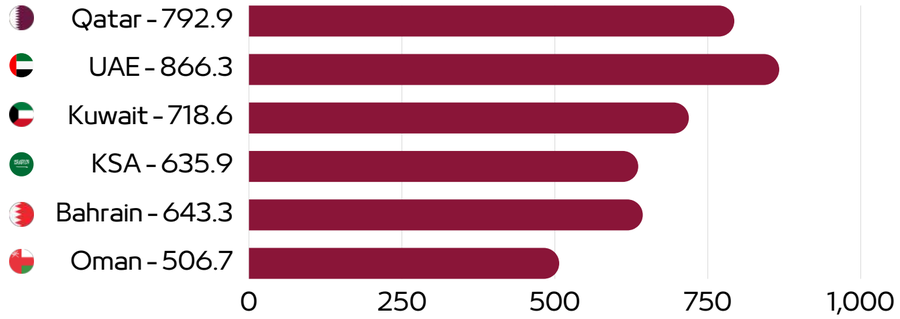
Sources: Speedtest by Ookla, CRA Quarterly Reports, IMD World Competitiveness Ranking

Qatar's investments in 5G infrastructure position it favourably in comparison with other countries in the region, placing first or second on key performance metrics.

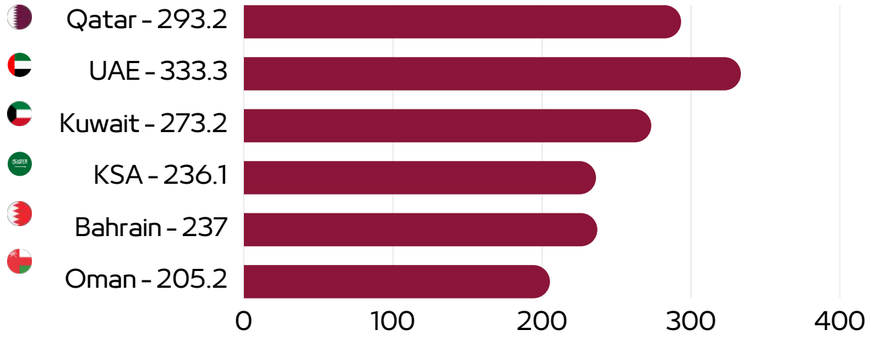
Mobile download speed - Mbps (Median November 2022



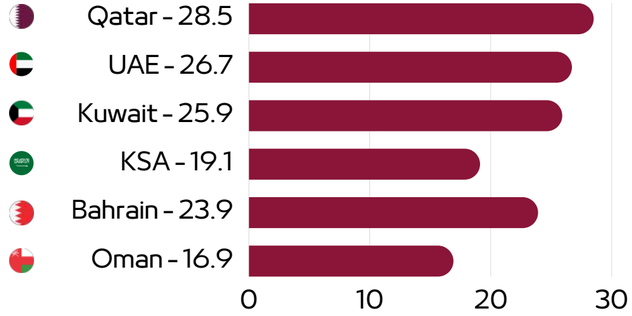
5G peak download speed (Mbps)



5G download speed (Mbps)



5G upload speed (Mbps)



Sources: Speedtest by Ookla, Open Signal 2022, CRA ICT Sector Survey 2022

Progress in Line with the CRA Strategy

Qatar National Development Strategy 2

"Develop a sustainable and high-quality infrastructure that supports the national economy and is capable of keeping abreast of the latest smart technologies"

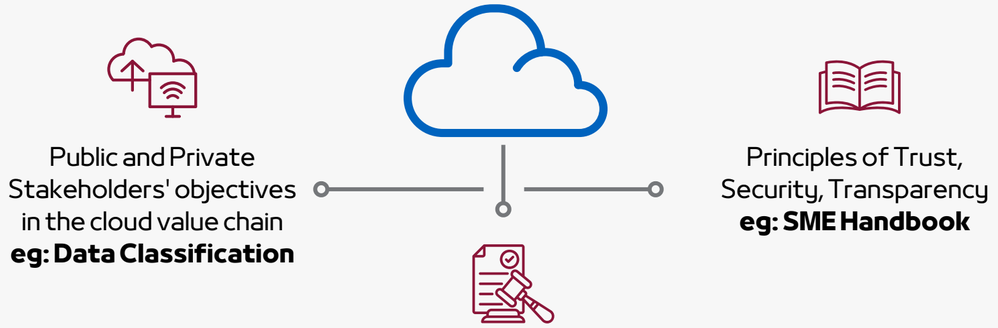
Cloud Policy & Ecosystem in Qatar

In 2022, the CRA published the Cloud Policy Framework, following a comprehensive public consultation in 2021. This framework emphasizes effective collaboration between government entities and private stakeholders, including Cloud Services Providers, data center providers, infrastructure and connectivity providers, software developers, online platforms, and cloud users. The Cloud Policy Framework recognizes the critical role of cloud technology as a foundational element for the digital transformation of the economy, enabling superior broadband infrastructure.

One of the primary objectives of this framework is to create an environment conducive to domestic and foreign investments in data centers and cloud services. It fosters a cloud-friendly atmosphere while ensuring compliance with essential requirements such as security, privacy, data protection, transparency, and digital inclusion for both individuals and businesses.

The effective implementation of the Cloud Policy Framework relies on the active involvement of competent government entities within their respective mandates. For instance, the Ministry of Communications and Information Technology (MCIT) has developed the "Cloud First Policy" as a clear commitment to procurement policies that prioritize cloud solutions and support their adoption. Cloud policy recommendations are now being implemented by both the CRA and MCIT and progress is being reported directly to the Minister.

CRA Strategy 2020 - 2024 - Cloud Policy Framework



The Cloud Policy Framework, issued by the CRA on 7 June 2022, establishes a cloud-friendly environment in Qatar and ensures essential requirements such as security, privacy, data protection, transparency, and digital inclusion are met.
Its main attributes are:

To attract investments, both foreign and domestic, in new digital services.

To support and enable the transition to a fully digitalized nation.

To help meet the objectives of Qatar becoming a digital hub.

To reduce carbon emissions by reducing on-premise data centers and promoting carbon neutral facilities.

CRA Licenses Starlink Satellite Qatar

Starlink booth outside Lusail Stadium during FIFA World Cup Qatar 2022™

The Communication Regulatory Authority (CRA) has issued an individual license to Starlink Satellite Qatar W.L.L. (Starlink) for the provision of public satellite telecommunications networks and services. Starlink, renowned as the world's first and largest Low-Earth Orbit (LEO) satellite constellation provides high-speed broadband internet access for activities like streaming, online gaming, and video calls.

The granted license allows Starlink to offer satellite broadband Internet services to individuals and businesses across Qatar. Starlink aims to provide direct-to-consumer satellite internet services, along with a specialized "Starlink Premium" service designed to cater to high-demand individual users and businesses. The premium service will offer download speeds ranging from 150-500 Mbps and low latency of only 20-40 ms.

This licensing milestone significantly enhances the availability of internet and telecommunications services in remote areas, particularly in regions that previously licensed companies have not fully covered, such as offshore zones for oil and gas platforms, sea vessels, and aircraft.

It introduces complementary and alternative telecommunications services for both individual and enterprise consumers while also offering backup communications throughout Qatar in the event of major ground-based network outages.

The issuance of this license aligns with global trends in the field and serves as a catalyst for ICT sector development, increased foreign investment, and increased competition in the ICT segment — helping Qatar position itself better as a hub of tech innovation.

Microsoft Launches First Global Data Center Region in Qatar

HE Mr. Mohammed bin Ali Al Mannai - Minister of Communications and Information Technology, officials from the US Embassy in Qatar, and Lana Khalaf, General Manager of Microsoft Qatar during the inaugural tour of Microsoft's new office in Burj Al Fardan, Lusail City. Image Credit: Microsoft

In collaboration with Qatar's Ministry of Communications & Information Technology (MCIT), in August 2022 Microsoft announced the launch of a new cloud data center region in Qatar. Microsoft is the first major cloud provider to open in Qatar, supporting Microsoft Azure services and Microsoft 365. This investment is expected to generate QAR 68 billion over a period of 5 years from 2022. This project has the potential to create around 36,000 jobs in Qatar and transform it into a digital hub for the region and the world.

The new three-zone region is based in Doha and is now available to all customers and partners. In response to Qatar's growing demand for high-performance computing, and fast and reliable access to Microsoft services, the new data center region will play a pivotal role in providing access to scalable, highly available, and resilient cloud services to accelerate the digital transformation and advance intelligent cloud adoption of businesses, customers, and partners across Qatar. The new data center region will contribute directly to Qatar's digital economy, and the Qatar National Vision 2030, by offering enhanced cloud services to support digitization.

The Qatar cloud data region will drive growth and scale for Microsoft customers and partners across the country. Microsoft customers including MCIT (Tasmu Platform), the Supreme Committee for Delivery & Legacy, and many others have already embraced the Microsoft Cloud to develop digital capabilities and innovate in their sectors.

Microsoft partners such as Ooredoo, Vodafone, EY, QDS, PWC, ICT, Malomatia, Intel, Mannai, Meeza, KPMG, Starlink, Paloalto Networks, Veeam, and Veritas continue to deliver transformative solutions across the Microsoft Cloud to drive customer success.

MCIT Signs Framework Agreement With Google Cloud

HE Mr. Mohammed bin Ali Al Mannai, Minister of Communications and Information Technology, meets with Mr. Thomas Kurian, CEO of Google Cloud at the announcement of the agreement.

MCIT awarded a framework agreement covering cloud computing services for the government sector to Google Cloud in October 2022. This agreement is an extension of the strategic collaboration agreement signed by the Qatar Free Zones Authority (QFZ) with Google Cloud in 2020 and anticipating the launch of the Google Cloud region in Qatar in 2023.

The framework agreement enables all government entities to leverage Google Cloud's computing services and digital transformation solutions to enhance their work. The focus is on how cloud technologies that rely on artificial intelligence (AI) and machine learning can be used at scale to support government entities in achieving their mission.

The partnership with Google Cloud will contribute to the growth of the digital sector in Qatar, and accelerate the process of digital transformation in the country, which is a fundamental pillar of the Qatar National Vision 2030.

The new region offers high-performance, low-latency services and products to public sector organizations, small, medium, and large enterprises, and startups in Qatar and the Middle East, and provides key controls that allow its customers to maintain high security, data residency, and compliance standards, including specific data storage requirements.

Research commissioned by Google Cloud and conducted by Access Partnership stated that the new Doha cloud region is expected to drive increased economic activity and is estimated to contribute a cumulative $18.9bn in higher gross economic output to Qatar’s economy between 2023 and 2030 and support the creation of 25,000 jobs over the same period.

Expansion of Qatar Internet Exchange Point (QIXP)

QIXP, the non-profit, carrier-neutral Internet Exchange Point, serves as a strategic nexus in Qatar's growing digital landscape. With 11 participants from various sectors, QIXP cultivates a vibrant digital ecosystem.

The mission of QIXP is to facilitate local internet traffic exchange, which enhances speed, security, and overall user experience. Prominent participants include Microsoft, Ooredoo, Vodafone, Gulf Bridge International, Meta, and others. The recent addition of Microsoft in 2022 has notably advanced Qatar's digital ecosystem through the localization of server traffic.

In addition, QIXP's strategic positioning is enhanced by the Ministry of Interior, Qatar Energy and Qatar Water and Electricity Corporation. Their participation underscores QIXP's alignment with national economic objectives.

Moreover, the involvement of international tech giants such as Microsoft and Meta highlights the global confidence in QIXP, while also amplifying access to digital content, stimulating competitive growth, and positioning Qatar as a significant data hub in the region.

However, without local content, the benefit of an Internet Exchange Point (IXP) such as QIXP is limited. Therefore, increasing the number of local and international content providers, particularly with significant connectivity bandwidth in the country as a result of 5G network and cloud regions.

Aiming to become a data hub, Qatar has been enhancing the capabilities of QIXP over the past few years. QIXP now operates with multiple switches, eliminating a single point of failure. The presence of QIXP alongside existing data centers allows members to connect easily and this arrangement reduces latency, improves round-trip time, and potentially lowers costs.

QIXP's current focus includes:

Upgrading QIXP to be a viable marketplace with cutting-edge hardware, software, and redundancy capabilities.

Expanding its network by adding quality local and international content providers, covering government, private, and academic sectors.

Encouraging more peering among members to maximize joint IP traffic exchange, particularly among large content providers.

Finally, Qatar's investment-friendly data sovereignty and governance laws make it an attractive destination for international content players, further reinforcing QIXP's pivotal role in Qatar's digital transformation.

Participating Entities in QIXP:

ooredoo
Microsoft
وزارة الداخلية Ministry of Interior State of Qatar دولة قطر
vodafone
GBI
جامعة قطر QATAR UNIVERSITY
ميزة MEEZA
قطر للطاقة QatarEnergy
مؤسسة قطر Qatar Foundation
Meta
KAHRAMAA كهرماء

Vodafone Qatar Partners With Saudi Telecom Company On Undersea Connectivity

Vodafone Qatar signed a 20-year agreement with STC (Saudi Telecom Company), a member of the 2Africa Consortium.

The agreement will allow Qatar to participate in a multi-regional project that will extend the submarine cable infrastructure to the Arabian Peninsula and South Asia, covering over 45,000 km of cable, and serving 3 billion consumers.

Submarine cable systems connect continents using reliable optical fiber technologies, delivering greater data transfer capacities that allow a faster digital data transfer possible.

As part of this agreement, Vodafone will build a new station for the submarine cables. The project will supplement the existing communication infrastructure in the country and position Qatar as a strategic gateway to the world.

Access to the cable system will positively impact the capacity, availability, and quality of internet connectivity in Qatar. It will allow companies in Qatar to create digital businesses that serve local and global markets and contribute directly to the nation's digital transformation journey.

IT Stakeholder Engagement Series 2022

The Communications Regulatory Authority (CRA) held a series of discussions involving large ICT players, ICT/digital economy startups and SMEs, government entities, R&D and innovation specialists, ICT investors and ICT buyers. The events formed a part of the extensive strategic CRA research study, devised with the purpose of gathering data and developing measurements and insights about the Information and Communications Technology (ICT) sector in Qatar's competitive growth, and positioning of Qatar as a notable tech hub in the region.

The events convened industry leaders and key decision-makers from an array of sectors in the following sessions, with an attendance of 133 people across the four events.

- **Roundtable on IT with participation from MCIT Minister.**
- **Workshop: ICT R&D and Innovation**
- **Workshop: Enablers of Qatar's ICT Sector**
- **Workshop: ICT Value Chain Localization**

During the sessions, participants engaged in vibrant dialogues on topics such as the potential for localizing ICT services and products, fostering innovation, attracting investment, and driving economic growth. They also deliberated on how Qatar could enhance the competitiveness of the ICT sector, while simultaneously contributing to job creation, and ultimately aiding the nation in its quest towards realizing its economic diversification goals.

Discussion topics spanned the full breadth of the ICT sector, including areas such as software development, infrastructure services, and technological equipment manufacturing. Attendees were encouraged to contribute their thoughts on how best to harness the potential of these areas.

The insights derived from these events were integrated into CRA's ongoing research study. The study is a strategic initiative that emphasizes understanding the local IT industry and the broader ICT sector and developing a comprehensive set of data and insights that can guide future sector development.

CRA continued to encourage participation in the study through a survey available until the end of June 2022. All IT businesses in Qatar were invited to contribute, helping to shape the future of the ICT sector in the country.

Building A Cloud Economy

Qatar's IT value chain is fortified through active collaboration and integration among key stakeholders. In a significant milestone, Qatar launched its first global hyper-scale cloud data center in August 2022, in partnership with MCIT. This collaborative effort enhances Qatar's global competitiveness, aligning with the goals of Qatar National Vision 2030.

To foster a future where AI plays a central role in all aspects of life, business, and governance, Qatar has established the Qatar Centre for Artificial Intelligence. The aim is for Qatar to become a role model for a seamless transition to an AI+X future, where AI is integrated into various domains. This initiative demonstrates Qatar's commitment to positioning itself as a global leader in AI adoption.

Regarding connectivity, both Ooredoo and Vodafone have made significant improvements to their network and operations. They have modernized their core networks, transitioning to a cloud-based architecture. Additionally, Ooredoo and Vodafone have enhanced the capacity of their domestic and international IP transport links, ensuring fans have sufficient bandwidth to access popular OTT services like Facebook, Instagram, and Snapchat.

These network enhancements have translated into an enhanced customer experience, evident in faster page load times for mobile users accessing Facebook during the World Cup. On 4G networks, average page load times were under 2 seconds, while on 5G networks, they were under 1.5 seconds. Similarly, video streaming start times improved from 2.3 seconds on 4G networks to 1.7 seconds on 5G networks.

To address the "digital deficit" and enable digital services and ecosystems, Qatar has prioritized and made initial progress on evolving its ICT policies and regulations. Cloud providers, hyper scalers, IoT providers, and the broader ICT ecosystem are aligning their plans and go-to-market strategies with the upcoming changes in the regulatory framework. This proactive approach ensures that Qatar is well-prepared to capitalize on the opportunities presented by digital transformation.

By enhancing cyber security measures, promoting AI adoption, improving network capabilities, and evolving regulatory frameworks, Qatar is strengthening its position as a leading player in the global cyber security and ICT landscape. These initiatives contribute to Qatar's vision of a digitally advanced and secure future.

Key regulatory areas

- Cloud-first policy
- Licensing of cloud service providers (CSPs)
- Data centres
- Data sovereignty
- Protection of subscriber data
- Guide for SMEs
- Quality standards
- Unlawful content

Cloud Computing Projects in Qatar

Nutanix and HPE recently signed their first joint deal with a large, well-known financial services company in Qatar. The deal involved HPE GreenLake in conjunction with Nutanix Enterprise Cloud as a Service.

Microsoft and SAP jointly announced the launch of RISE with SAP in Microsoft's cloud data center in Qatar. SAP Customers in Qatar can now host RISE with SAP on Microsoft Azure, expanding opportunities for building a cloud-first economy in Qatar, the GCC, and the MENA region.

Al Fardan Group – a conglomerate of top businesses covering a wide range of industries and sectors in the region, has partnered with Google Cloud to support the Group's digital transformation and revolutionize its business processes by implementing cloud technologies.

Google Cloud officially opened its new Doha cloud region, to meet the growing demand for cloud services in Qatar and the Middle East and support Qatar National Vision 2030, which aims to transform the country into a digital economy through innovation and digital transformation. The launch marks a significant milestone in a partnership that started in 2020 with an agreement to establish Google Cloud's region in Doha.

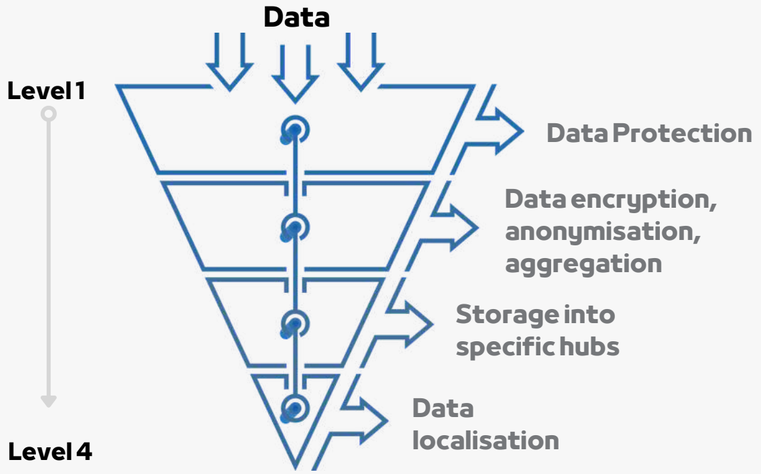
Cloud-First Policy

MCIT has developed a cloud-first policy focused on procurement processes and aimed at reducing deployment time and cost, leveraging the latest technologies across the three layers: infrastructure, platforms, and applications — and outsourcing management and maintenance overheads. Qatar will implement a cloud-first policy for public procurement of cloud services by government entities that is consistent with the principles of the Cloud Policy Framework. Cloud solutions will be prioritized ahead of any on-premise solutions and based on a clear data classification policy.

Data Classification

When moving to the cloud, organizations will implement data classification schemes based on their level of confidentiality, integrity and availability of data. For the most sensitive categories, it may be appropriate to provide elevated protection e.g. private cloud and/or encryption.

Security



International Standards for Cloud-First Policy

- **CSA STAR, ISO 22301** (Business Continuity Management Systems)
- **ISO/IEC 27001** (Information Security Management)
- **ISO/IEC 27701** (Privacy Information Management)
- **ISO/IEC 27017** (Cloud Security)
- **ISO/IEC 27018** (Cloud Privacy)
- **ISO/IEC 27035** (Incident Reporting)

Key Providers of Cloud Services in Qatar

Provider	Services	Data Centers in Qatar
Microsoft	Azure, Microsoft 365	New Cloud Region in Qatar – Certified by the NCSA
Google	Google Cloud Platform, Google Workspace	New Cloud Region in Qatar – Certified by the NCSA
ooredoo	Data Center Services (Data storage, backup, recovery, and security)	Ooredoo's data centers in Qatar
MEEZA	Data Center Services, Managed IT services, Cloud services, Security services, Solution services, Workplace services	M-VAULT 1, M-VAULT 2, M-VAULT 3 at QSTP and Duhail; M-VAULT 4 (under construction as of 2021) at QSTP; M-VAULT 5 at QSTP
aws	Cloud infrastructure and platform services (Compute, storage, database, analytics, networking, security, etc.)	No data center in Qatar, but has regions in Bahrain and UAE

Provider	Services	Data Centers in Qatar
smit Smart Management IT Solutions	Cloud computing, data center, IT solutions	Government
IBM	Full stack cloud platform (Data, containers, AI, IoT, blockchain, etc.)	No location in Qatar
HUAWEI	Huawei Cloud Stack (Hybrid cloud solution for on-premises or on Huawei's public cloud), Industry-specific cloud solutions (Finance, healthcare, education, government, etc.)	Planned provision of Cloud Services from Qatar in 2023
ORACLE	Comprehensive cloud computing (Application development, business analytics, data management, integration, security, AI, blockchain, etc.)	No location in Qatar
QUANTUM SWITCH	Data Services, Managed IT Services, Cloud Services in Qatar. 6MW Data and 4MW, two data centers in Doha, with a capacity to double up.	At the outskirts of Doha, Qatar

02 CRA Market Landscape: **Telecom**

2022 saw Qatar's technology markets build on their achievements from the previous year. There was progress on the government's strategy to drive digital transformation as a key enabler of economic diversification of Qatar, as enabling infrastructure — such as data centers and cloud-based technologies — gained traction in Qatar with an increase in the uptake of these services. An increasing number of public and private companies are currently migrating towards digitization, and the technology ecosystem has extended its focus from telecom service providers to include IT companies. CRA commissioned a survey of the IT sector in Qatar in 2022, the findings of which are expected to be published in Q2 2023 — shedding more light on the current status and needs of these companies.

Agencies responsible for policy making, regulation and development of Qatar's ICT sector are:

MCIT (e-government, Market development, ICT policies)
CRA (Regulations of Telecom, IT, ADM, Postal services)
NACSA (Cybersecurity)
MADA (Digital inclusion for special needs)
DIC (entrepreneurship)

وزارة الإتصالات وتكنولوجيا المعلومات
Ministry of Communications and Information Technology
State of Qatar • دولة قطر

Communications Regulatory Authority State of Qatar | هيئة تنظيم الاتصالات دولة قطر

mada مدى digital access for all نفاذ رقمي للجميع

الوكالة الوطنية للأمن السيبراني
National Cyber Security Agency

حاضنة الأعمال الرقمية
Digital Incubation Center

Individual licensees and services provided in Qatar as of 2022

ooredoo	**Fixed & Mobile**
vodafone	**Fixed & Mobile**
qnbn	**Passive Fixed**
UDC UNITED DEVELOPMENT CO.	**Wholesale Fixed**
Es'hailSat سهيل سات Qatar Satellite Company	**Public Satellite Services**
STARLINK	**Public Satellite Services**
RigNet	**VSAT**
QSAT	**VSAT**
speedcast	**VSAT**

Mobile and Fixed Telecom Markets Summary

The mobile telecom market in Qatar is performing very well. 5G network coverage is above 98%, and prices are reasonable and competitive, especially for higher usage. This illustrates that competition has positively impacted this market as the challenger Vodafone Qatar has created a healthy competitive market with high performance. One of the main remaining challenges is to implement industrial IoT solutions based on 5G use cases.

For the fixed market, fiber coverage is almost universal, but prices are high. The entry of Vodafone Qatar has not had the same beneficial effects on the competition here as for mobile services due to structural constraints. This has resulted in a less competitive fixed market with lower performance. The CRA will therefore evaluate appropriate actions to establish a better-performing fixed market.

Service Provider Performance

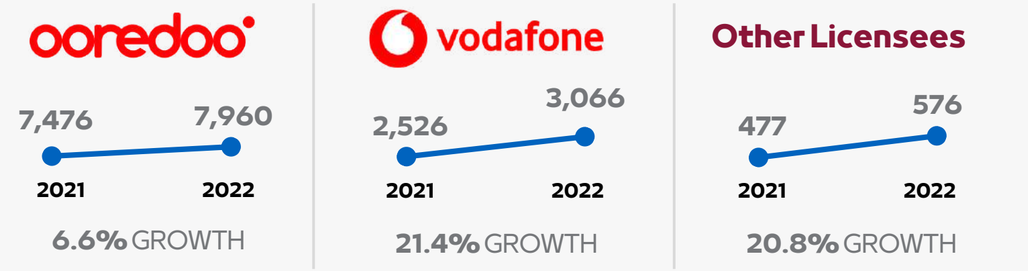
Ooredoo and Vodafone remain the primary players in Qatar's telecom sector, both offering phone and broadband services over fixed and mobile networks. Both providers are listed companies and have a transnational footprint as part of their respective groups.

Ooredoo Qatar increased its revenue by 7% in 2022, to QAR 8.0 billion with an EBITDA of QAR 3.8 billion, at par with the previous year. Growth was primarily driven by post-paid services, Ooredoo TV, and ICT services.

Vodafone Qatar grew its total revenues by 21.4% to QAR 3.1 billion and EBITDA of QAR 1.2 billion—an increase of 19.7% over the previous year. The company has improved its market position through continuous innovation and service quality for consumers and businesses alike.

Total revenues for the sector grew to QAR 11.5 billion in 2022. Fixed and Mobile services dominated—with Ooredoo contributing 69.1%, and Vodafone 26.6%, and other licensees 4.3% of total revenue. Growth in revenue realization—at 10.0% (QAR 1,049 million)—was primarily in the ancillary services and secondarily related to FIFA World Cup Qatar 2022. This is indicative of the diversification of business models in the ICT sector.

Telecom Sector Revenue by Main Licensees in Qatar



Source: CRA

Ooredoo Qatar used a new AI-powered process of identity authentication and SIM card activation to speed up and simplify its onboarding process. The service deployed a sophisticated AI-based digital Know Your Customer technology to establish the real identity of users quickly and efficiently in the digital world.

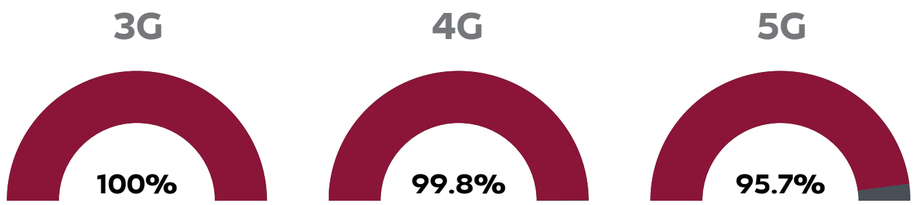
Vodafone continued to expand its Fiber Optic infrastructure, engaged in additional B2B projects and initiatives, and has taken on ever more complex ICT & Managed Service projects. Strong subscriber and revenue growth coupled with cost efficiency increased net profits for 2022. Examples of Vodafone's ongoing projects include public Wifi for public transportation, private P25 Networks for public safety, and specialized connectivity solutions for universities.

Mobile Networks and Services

Qatar boasts one of the highest levels of coverage for high-speed mobile services in the world. As a pioneer in 5G implementation, an astounding 95.7% of Qatar's population had access to 5G services by the end of 2022. At 4.4 million mobile broadband subscriptions, and a penetration rate of 149% (excluding visitors to the FWC 2022 Qatar), mobile internet access is essentially ubiquitous throughout Qatari society.

Data: Population coverage by mobile technology

Mobile coverage by technology 2022



CRA continues to perform regular network audits to monitor data transmission speeds. The latest audit (Q4 2021) determined the "average download throughput – maximum" at 700.9 Mbps—representing an increase from Q4 2020 when the average maximum speed was 672.3 Mbps. Meanwhile, maximum mobile speeds increased considerably in 2022 in preparation for the FWC 2022 Qatar, however, precise measurements have not yet been published.

The higher speeds available reflect a consistent investment in high-quality networks by service providers and serve an increased appetite for data consumption by a tech-savvy population.

In 2022 Qatari ICT Minister Mohammed bin Ali Al-Mannai approved CRA amendments to the network rollout and coverage obligations in Ooredoo Qatar and Vodafone Qatar licenses. These amendments aim to enhance service quality and expand 5G availability in Qatar.

The CRA will release additional spectrum in the 3.5 GHz and 26 GHz bands to service providers, offering up to 1,000 MHz of bandwidth based on demand. This increased bandwidth improves network capacity and enhances the speed of the 5G network, resulting in a better telecom consumer experience. The goal is to achieve 99% 5G network coverage in Qatar by 2024, with a minimum download speed of 100 Mbps.

Mobile Services Pricing

Qatar's telecom market typically has had higher prices even among regional peers. However certain segments are competitive. Qatar is currently 10th highest in the ITU ranking on price as a percentage of Gross National Income (GNI) for the high usage mobile voice and broadband basket (140 minutes/month, 70 SMS, 1.5 GB data, on 3G or above networks).

International price comparisons by ITU and OECD consider the service basket for multiple usage patterns. Data is collected from service providers and validated via their websites. However, since the service offerings differ between countries, comparisons are not exact. Pricing is typically indexed as a percentage of GNI, in QAR and USD PPP levels.

Data: Relative Ranking by ITU based on Mobile prices for high-usage bundles 2021*

ITU Affordability Index Ranking (High Consumption basket)	Percent of GNI	Price in QAR (monthly)
10	0.40%	QAR 60

(*Last Available Audit)

The organization for cooperation between Arab telecom regulators, AREGNET, conducts an annual price benchmarking study of telecom prices among its member states based on OECD methodology and baskets. Based on prices for December 2021, mobile prices in Qatar compare well to GCC averages while they in general are higher than OECD averages.

Prices for lower-usage mobile baskets are close to OECD averages while prices get comparatively higher in Qatar (and the GCC average) as usage increases.

Data: Mobile prices compared by AREGNET

	QATAR	OECD	GCC
Residential 100 calls, 2 GB data (QAR PPP mth)	62	54	87
Residential 900 calls, 10 GB data (QAR PPP mth)	186	87	243

Source. AREGNET (Teligen)

Fixed Broadband Services

Qatar has excellent fiber-optic coverage and is among the leading nations for access to fixed services with 99% of the population having access to high-speed fiber.

Data: Key Metrics for Fixed Services (2022)

Fiber Population Coverage	Broadband Subscriptions (>30 Mbps)
99%	95%

Data: Subscribers for Fixed Services (2022)

Fixed Voice Subscriptions	Fixed Broadband Subscriptions
0.5 million	0.4 million

Source. Ooredoo and Vodafone Qatar

Data: Fixed Broadband Speed (Megabits per Second)

	<10 Mbps	10-30 Mbps	30-100 Mbps	>100 Mbps
2022*	0%	5%	23%	72%
2021	1%	8%	38%	54%

(*As of Q3 2022)

Fixed Services Pricing

Price comparisons for fixed services are bound by similar constraints as those for mobile offerings. However, higher competition as a result of Vodafone rolling out its own network - and taking market share from Ooredoo - has resulted in improved service offerings and more competitive pricing in the market, especially for the business segment - albeit less competitive than the mobile market in Qatar.

Qatar is ranked in 68th place for the affordability of fixed broadband (price in USD as a % of GNI). CRA will continue to support the creation of user-friendly and value-for-money offerings, especially in the enterprise and business segments.

Data: Fixed prices compared by ITU (2022)

ITU Affordability Index Ranking	Percent of GNI	Price (monthly)
68th	2.2%	QAR 330

The AREGNET study which is based on OECD methodology also includes comparisons of fixed pricing and includes Vodafone Qatar's offerings while the ITU study only includes Ooredoo Qatar. For OECD more than one service provider is included per country while for GCC only the incumbent is included. This makes a big difference, as incumbents are often more expensive than newcomers. Fixed broadband prices in Qatar are lower than GCC averages but notably higher than OECD averages.

Fixed broadband AREGNET

Residential 100 Mbps (QAR PPP month)

Qatar	OECD	GCC
275	113	594

Fixed broadband AREGNET

Business 100 Mbps (QAR PPP month)

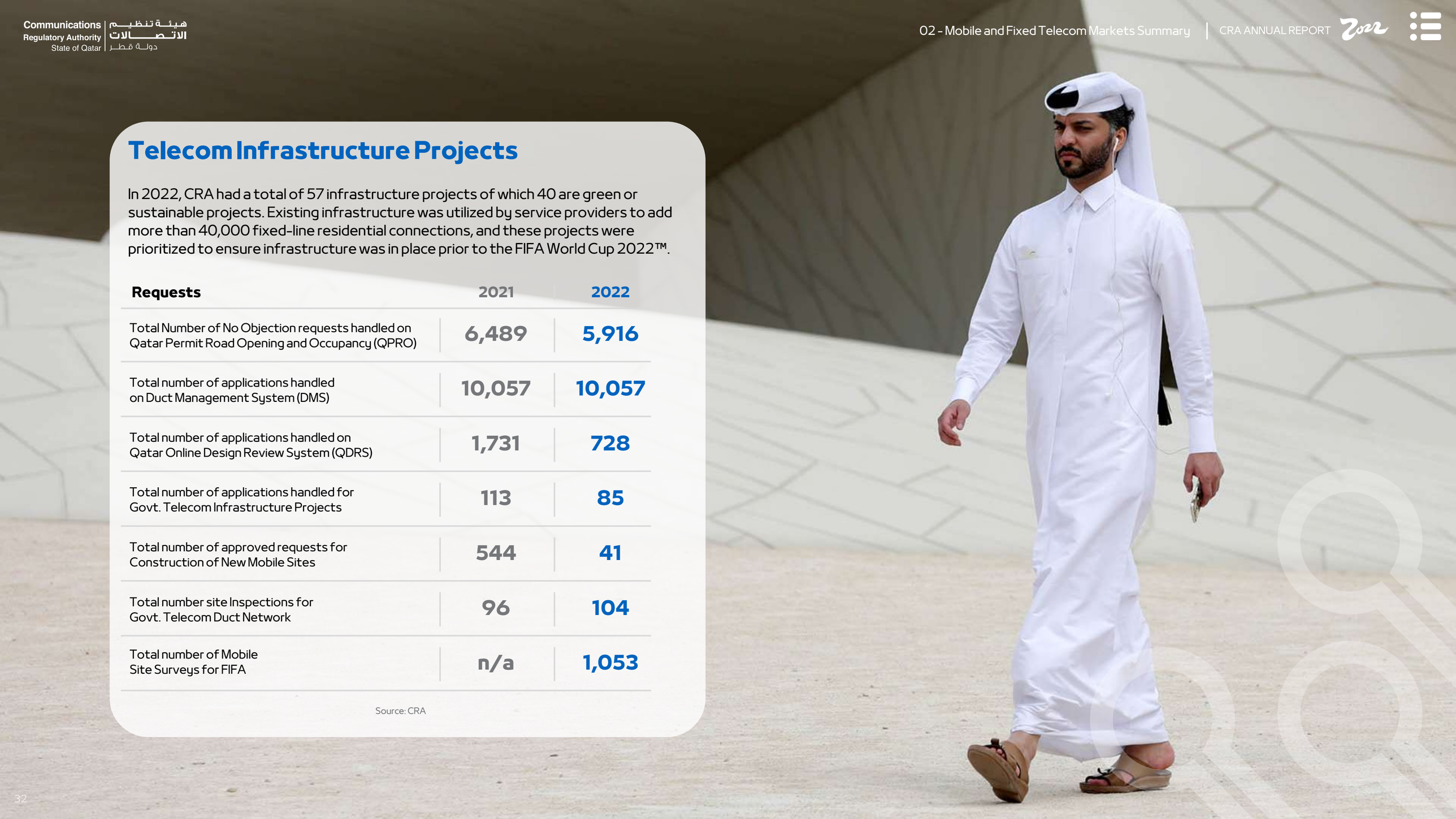
Qatar	OECD	GCC
361	136	1,048

Telecom Infrastructure Projects

In 2022, CRA had a total of 57 infrastructure projects of which 40 are green or sustainable projects. Existing infrastructure was utilized by service providers to add more than 40,000 fixed-line residential connections, and these projects were prioritized to ensure infrastructure was in place prior to the FIFA World Cup 2022™.

Requests	2021	2022
Total Number of No Objection requests handled on Qatar Permit Road Opening and Occupancy (QPRO)	6,489	5,916
Total number of applications handled on Duct Management System (DMS)	10,057	10,057
Total number of applications handled on Qatar Online Design Review System (QDRS)	1,731	728
Total number of applications handled for Govt. Telecom Infrastructure Projects	113	85
Total number of approved requests for Construction of New Mobile Sites	544	41
Total number site Inspections for Govt. Telecom Duct Network	96	104
Total number of Mobile Site Surveys for FIFA	n/a	1,053

Source: CRA



Highlight:
ICT Sector Classification

CRA launched an ICT sector study dedicated to filling the data and information gap related to the industry, with a focus on the Information Technology sub-sector where this gap is most substantial.

The classification document created as a result intends to provide all stakeholders with basic principles of classification and definitions for each category/segment; create sector-specific categorization that covers all ICT products and services in Qatar; establish a framework for CRA and other stakeholders to gain an understanding of the market; and to enable CRA and other relevant entities to assess the overall sector and conduct outcome-driven analyses.

One important aspect of this document is that it was initially created as part of the research design but later requested by the Minister to undergo public consultation. The final version will now be officially recognized as a national ICT sector-specific classification and will go through review cycles alongside the new iterations of the survey.

Classification

The IT domain includes both traditional information technology and emerging technology (ET). Traditional IT involves the use of computers, storage, networking, and other physical devices, infrastructure, and processes to create, process, store, secure and exchange all forms of electronic data.

Emerging technologies (ET) are innovative technologies that have been recently developed, are under development, or will be developed within the next few years, and that are creating, or are expected to create, significant social or economic effects.

Emerging Technologies In The Classification

- Cybersecurity
- Extended Reality (AR, VR)
- Big Data
- Machine-to-Machine (M2M)
- Artificial Intelligence
- Blockchain / Distributed Ledger
- Machine Learning
- Edge Computing
- Internet of Things (IoT)
- Next-Gen Networks

The classification offers an expanded view of emerging technologies when compared to the CRA Strategy 2020-2024 document. A more holistic scope has been provided by incorporating additional relevant technologies in the classification.

ICT Classification Principles

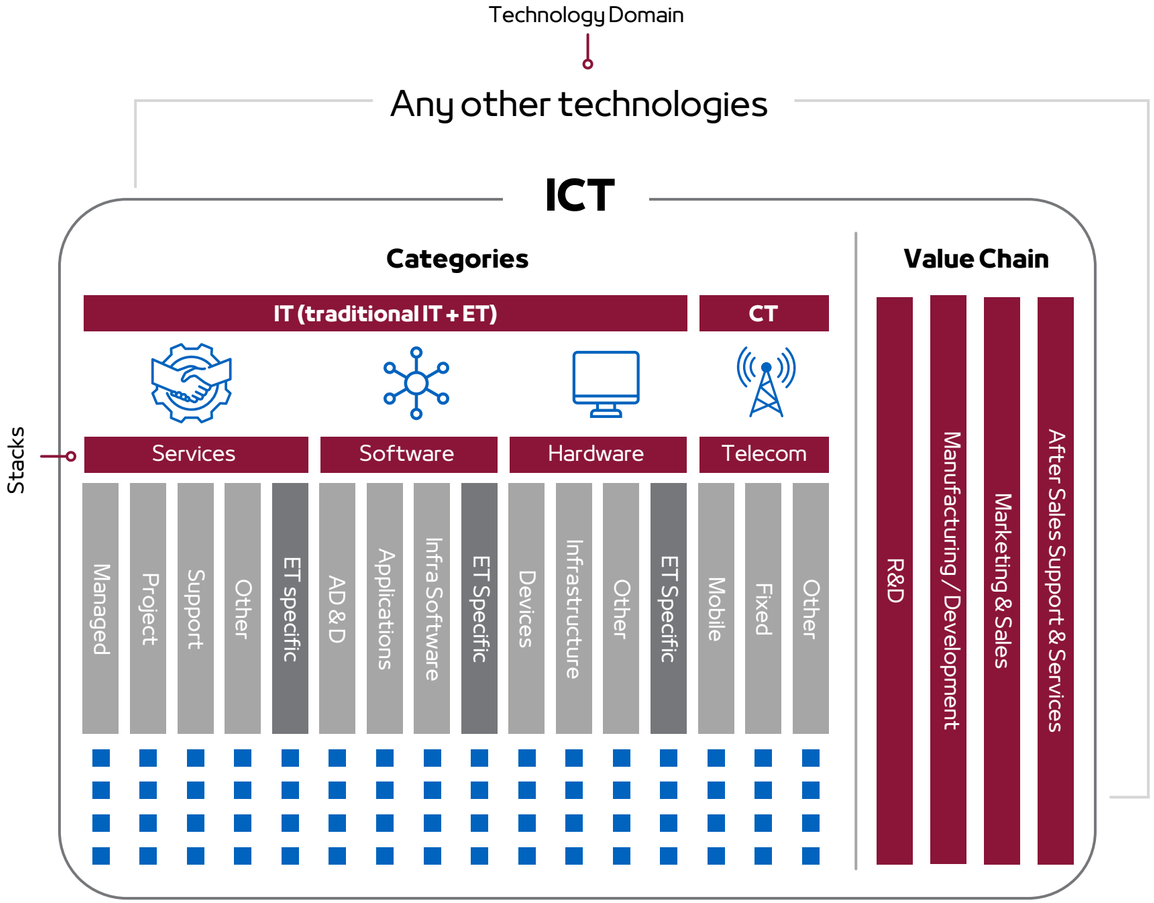
The classification document considers four dimensions in its design:

1. To strike a balance between simplicity vs. complexity of categorization
2. To support the measurement and development of Qatar's ICT sector
3. To focus on categories relevant today as well as the emerging categories that despite their limited size currently offer superior long term potential
4. To ensure regular updates in response to future technologies

The final classification was built upon three standards: the International Standard Industrial Classification (ISIC), KSA Information Technology (IT) / Emerging Technology (ET) Sector Classification and the IDC Black Book Taxonomy.

The general classification structure, visualized in the figure on the right, is designed to be future-proof and flexible, especially considering the likely incorporation of emerging technologies.

Modularity in the design allows for future adjustments to include new market trends or additional technologies. Classification, therefore, refers to the total structure, including the classification of categories and the classification across the value chain.



The design broke down the market into four buckets: Services, Software, Hardware and Telecommunications as a Category 1 classification. Of these, the first three segments form the IT segment of the overall market.

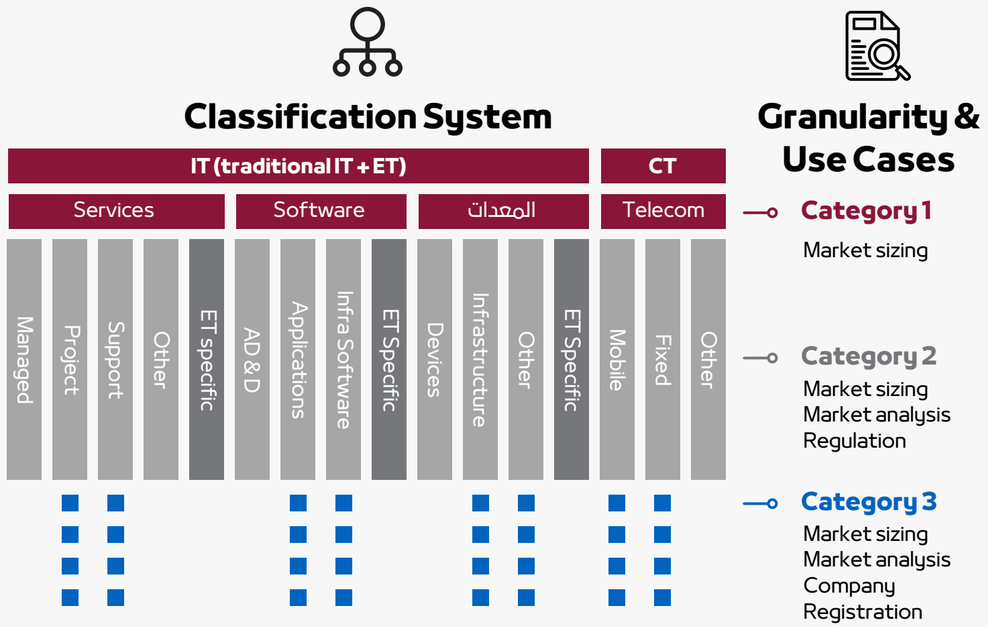
Each of the segments was then further broken down into its constituent components. For example, services were broken down into managed services, project services, support services, ET-specific services, and others. The sizing for each of these constituent components and analysis will provide further details and insights into the market.

To further verify the relevance and utility of the designated classification, key use cases are identified:

Category 1:
Applicable to market sizing; immediate comparison is limited due to high-level definition

Category 2:
Applicable to market sizing, market analysis and regulation; some categories are comparable

Category 3:
Applicable to market sizing, market analysis, company registration and comparability; comparison is possible due to granular definition



A fundamental objective of the classification is to provide a market structure framework for regulatory assessments and further targeted market analysis. In other words, this use case will help develop a structure for each segment based on the nature of its business. The use case will be based on three main sources: Secondary research, Benchmark analysis against comparable countries in ME, and the Survey results (standard/in-depth)

The most granular levels are at the category 3 level of the classification which serves the purpose of prospective IT business registrations and the online IT company platform, as a planned CRA initiative.

The expected outcomes at this stage will be:

- Listing business activities on a company level for each IT business active in Qatar.
- Publishing data via an online registration platform.
- Identifying primary and secondary activities on a company level.
- Providing detailed measurements on the maturity and sophistication on a company level of the ICT sector overall, both static and over time.
- Establishing the classification as a national sector-specific reference.

03 CRA Performance Review

CRA Performance Indicators

The regulatory function of the CRA includes tasks such as registration of Qatar domains, receiving and acting on consumer complaints on telecom services, issuing approvals to import radio and telecom terminals equipment into Qatar, issuing licenses for marine radio equipment and hunting radio stations, and issuing custom clearance certificates for imports of certain categories of personal devices.

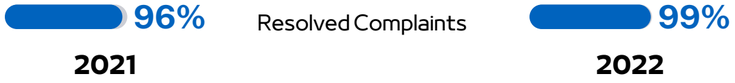
We periodically measure our performance on key tasks.
Results for 2022 are illustrated on the following slides

Fixed & Mobile Number Portability Indicators

	2021	2022
Mobile Numbers Allocated	0	2,300,000
Mobile Numbers Cumulative	9,700,000	12,000,000
Mobile Numbers Ported	29,584	315,645
Mobile Numbers Returned Under Mobile Number Portability	1,369	56,658
Fixed Numbers Allocated	20,000	36,000
Fixed Numbers Allocated (Cumulative)	1,544,000	1,580,000

Consumer Protection Indicators

	2021	2022
Total Number of Complaints & Inquiries	2467	2389
Total Number of Valid Complaints	768	844
Resolution Percentage by Provider: Ooredoo	na	98%
Resolution Percentage by Provider: Vodafone	na	96%
Percentage of Valid Complaints by Line Type: Fixed	69%	24%
Percentage of Valid Complaints by Line Type: Mobile	31%	76%



Note:

Mobile Services Complaints Include: Mobile Number Portability, Postpaid billing, and Packages Issues.

Fixed line Services Complaints Include: Internet Service Disconnection, Internet Speed, and Billing Issues.

Source. CRA

Web Indicators

Domains Registered - .qa, .com.qa, sch.qa, قطر

2021	2022
1,176	1,895

Total Number of Registered Domains

2021	2022
124,945	26,9401

% Increase in Total Number of Registered Domains

2021	2022
14.9%	7.75%

Percentage Splits of Top 3 Domain Extensions

	2021	2022
.qa	58.7%	66%
.com.qa	29.6%	28%
قطر	2.5%	2%

Infrastructure Indicators

Approvals for Construction of New Mobile Sites

2021	2022
544	44

Rejected Requests for Construction of New Mobile Sites

2021	2022
60	2

Applications Handled on Qatar Online Design Review System (Q-DRS)

2021	2022
1469	709

Total Number of Applications Handled on Duct Management System (DMS)

2021	2022
na	1,039

Total Number of Applications Handled for Govt. Telecom Infrastructure Projects

2021	2022
na	85

Total Number of No Objection Requests Handled on Q-PRO System

2021	2022
556	3247

Source. CRA

Licensing and Regulatory Updates

- A public consultation on the Regulatory Options for 5G Private Mobile Networks has been prepared and managed. Completion of this project is expected in Q1 2023, following continued consultation with key stakeholders.
- We have also prepared and issued an Individual License to Starlink Satellite Qatar (SpaceX) for providing public satellite telecommunications services. This process included an industry consultation.
- A comprehensive revision of the Resale Class License and Private Network Class License has been undertaken, incorporating a public consultation.
- A draft Individual License for security services has been prepared and the licensing process initiated, with completion anticipated by Q2 2023.
- We have prepared a draft Licensing Framework for Telecommunications Networks and Services, which is now pending translation and issuance.

Market Data Studies

The core responsibilities of data collection, analysis, and reporting to prepare market data study lie with our Licensing & Compliance Team. In 2022 the following tasks were done by this team:

- **Implementation of the New MDDD Reporting**
- **Published the Price Benchmarking Study**
- **ITU G5 Regulatory Benchmark -** 1st phase to achieve highest G5 status
- **Updated the Quarterly Telecom Reports**

Tariff Updates

- Service Providers notified us of 237 retail tariffs.
- 98% of these tariffs were approved, while 2% were disapproved due to anti-competitive concerns.
- One Service Provider lodged 32 complaints against another Service Provider. The CRA investigates each complaint thoroughly. If the Service Provider fails to implement corrective measures, the CRA may issue a Notice of Non-compliance and/or impose a fine.

Financial Updates

- The regulatory financial accounts of Ooredoo have been approved.
- We have determined the wholesale and interconnection charges for licensed service providers.
- We have set the license and industry fees payable by Service Providers to the CRA.
- All other financial matters concerning service providers have been resolved, with no outstanding or pending issues remaining for 2023.

Spectrum Management and Allocation

CRA's Spectrum Management team led a carefully planned and executed process to handle multiple global scale events in Qatar, particularly the FIFA World Cup Qatar 2022™ - discussed at greater length in Chapter 4.

In 2022, we granted over 25,000 permits for radio applications and equipment — an unprecedented number. This allowed a range of stakeholders, including the host nation, the International Federation of Association Football (FIFA), FIFA contractors, FIFA's commercial partners, and media outlets, to own and operate such radio equipment and applications at the official venues of the FIFA World Cup Qatar 2022™ and other events. These authorizations were integral to broadcasting the events, streamlining operations, and orchestrating logistics.

Event	Timeline
MotoGP	March 2022
Amiri Cup	March 2022
FIFA Congress	March 2022
Milipol	May 2022
FIFA Play Off Matches	June 2022
Qatar Super League	August 2022
Lusail Super Cup	September 2022
Darb Lusail	November 2022
FIFA World Cup Qatar 2022™	December 2022

We actively participated in the 14th edition of Milipol Qatar, organized by the Ministry of Interior (MoI). During the event, we showcased the latest and most advanced Mobile Monitoring Systems (MMS) for monitoring the radio spectrum in Qatar. The MMS is part of the Automated Spectrum Monitoring Systems (ASMS) and enables the CRA to monitor radio spectrum up to 40 GHz.

Additionally, we presented a state-of-the-art solution, the Automated Drone Detection System (DDS), which effectively detects, identifies, classifies, locates, and tracks various types of radio-controlled drones and their remote controllers. This integrated system covers all available technologies of commercial drones. By implementing this system, the CRA aims to safeguard the radio spectrum from interference and unauthorized radio emissions caused by unlicensed radio-controlled drones, which can disrupt radio communication networks.

CRA Spectrum Outlook

As data usage continues to surge and indoor applications take center stage, our strategic focus is on spectrum management to address evolving needs. Several target applications have been identified, including retail, indoor enterprise, massive IoT, as well as Augmented, Virtual, Mixed, and Extended Reality (AR/VR/MR/XR) applications.

One significant trend is the increasing share of Wi-Fi traffic with each cellular generation. Recognizing this, the CRA acknowledges the importance of next-generation use cases that demand expansive computational resources and connectivity capabilities far beyond what wide-area networks like IMT can provide. Instead, these use cases require local-area, short-range communications, such as the upcoming Wi-Fi technologies designed for high throughput, low latency, and spectral reuse.

To meet the requirements of advanced use cases, Wi-Fi 6E has emerged as a crucial technology. It offers faster speeds, lower latency, higher efficiency, and greater density, making it suitable for a wide range of applications. Looking ahead, the introduction of Wi-Fi 7 will further enhance support for VR/AR/XR, industrial IoT, automotive, telepresence, and immersive 3-D experiences, delivering higher data rates of up to 30 Gbps while ensuring stringent requirements for latency, reliability, and quality of service (QoS).

In terms of network rollout and coverage obligations, the CRA aims to revise and amend these obligations by 2026. Collaborative discussions with service providers (SPs) will be crucial in determining the new obligations and ensuring their alignment with evolving technologies and market demands.

Another key focus area is the implementation arrangements for 5G Standalone (5G SA) technology. The CRA is currently engaged in discussions with SPs to ensure their readiness for the evolution to 5G SA and to establish the necessary arrangements to support its deployment.

Furthermore, the CRA and SPs are considering the phasing out of legacy networks, such as 2G or 3G, as part of the overall network modernization efforts. This transition will pave the way for more advanced technologies and better utilization of spectrum resources.

Additionally, the re-farming of the 2600 MHz spectrum from FDD to TDD arrangements is being evaluated. This initiative aims to optimize spectrum allocation and utilization to meet the evolving needs of wireless services.

In summary, the CRA's outlook for spectrum management in 2023 focuses on addressing the growing data demands of indoor applications, exploring advanced Wi-Fi technologies, revising network rollout obligations, preparing for 5G SA implementation, phasing out legacy networks, and optimizing spectrum utilization through re-farming efforts. These initiatives aim to foster a dynamic and future-ready telecommunications landscape in Qatar.

Stakeholder Engagements 2022

1 Second FIFA World Broadcaster Meeting

CRA attended the Second FIFA World Broadcaster Meeting held in Doha on March 29th, 2022, and interacted with the representatives of Media Rights Licensees (MRLs) for FIFA World Cup 2022™. At the event, we familiarized the MRLs with applicable procedures to obtain radio spectrum, testing, and tagging procedures and CRA's procedures to monitor the spectrum before and during the event.

2 CRA Supports Lusail Super Cup™

CRA ensured that all stakeholders in the Lusail Super Cup™ were using and operating radiocommunications and broadcasting services as required and without interruption due to any radio interference.

3 Preparing for ITU PP-22

CRA Qatar participated in the 4th preparatory meeting of the Arab working group in charge of preparing for the ITU Plenipotentiary Conference PP-22 in Abu Dhabi.

4 CRA Participates in S'hail Exhibition

In line with the Communications Regulatory Authority (CRA) efforts and its continuous endeavor to raise awareness of the applicable regulatory framework in the State of Qatar, CRA participated in the sixth edition of "S'hail - Katara International Hunting and Falcons Exhibition", organized by the Cultural Village Foundation (Katara) from 5 - 10 September 2022 in Katara. This year's exhibition aimed to familiarize falconers and hunting lovers with its procedures related to hunting radio devices licensing and other wireless devices used for hunting purposes within the limits of its responsibility, which includes regulating and managing all matters related to the use of radio spectrum in the State of Qatar. Also, CRA seeks to raise awareness among the public regarding owning and using wireless devices and the procedures that must be followed before purchasing or importing them into the country.

5 14th International Event for Homeland Security & Civil Defence

CRA participated in the 14th International Event for Homeland Security & Civil Defence #MilipolQatar 2022, which is held from May 24-26 where we showcased the latest and most advanced radio spectrum monitoring systems used in Qatar — including our Mobile Monitoring Stations (MMS), which form part of the Automated Spectrum Monitoring System (ASMS).

6 Driving IPv6 Adoption: CRA Welcomes 15 New Members to the Taskforce

The Communications Regulatory Authority (CRA) has announced the expansion of the Internet Protocol Version 6 (IPv6) Taskforce with the addition of 15 new members. With a total of 33 members the Taskforce represents various sectors, including government entities, private companies, service providers, academic institutions, and financial institutions, along with aviation and oil and gas sectors.

The CRA has established the IPv6 Taskforce to drive the adoption of IPv6 in Qatar. Taskforce members play a crucial role in ensuring network readiness for IPv6 and facilitating a smooth transition from IPv4 to IPv6. Their primary mission is to provide technical consultations, training, and guidelines to entities interested in adopting IPv6.

Among the 15 new members are the Ministry of Commerce and Industry, Ministry of Education and Higher Education, Ministry of Public Health, General Tax Authority, General Authority of Customs, Qatar Museums, Qatar National Library, Qatar Gas, Nakilat, Oryx GTL, Qatar Foundation, University of Doha for Science and Technology, Hamad Bin Khalifa University, Community College of Qatar, and Weill Cornell University.

The CRA encourages others to join this important journey toward IPv6 adoption in Qatar. IPv6 serves as the backbone of the Internet for the next several decades, providing a larger number of IP addresses to accommodate Internet growth and facilitate the implementation of emerging technologies like the Internet of Things (IoT). By joining the Taskforce, entities can contribute to the development of Qatar's Information and Communications Technology (ICT) sector, supporting the goals of the Qatar National Second Development Strategy 2018-2022 and Qatar National Vision 2030. Embracing IPv6 is crucial for building a sustainable and high-quality infrastructure that keeps pace with the latest smart technologies and promotes the diversification of Qatar's economy from an oil-based to a knowledge-based economy.

International Participation 2022

1 Participation in Mobile World Congress in Barcelona

The MWC 2022 brought together the largest companies in the mobile industry, telecom service providers, regulators, policymakers, decision-makers, and experts in the field from more than 180 countries around the world. The four-day event included several sessions related to various topics such as the Fifth Generation (5G) technology, cloud services, the Internet of Things (IoT), innovation ecosystems, and other topics. The associated exhibition hosted more than 1,800 exhibitors showcasing the latest and most innovative products and technologies in the mobile industry.

2 Public Outreach Event to Mark World Consumers Rights Day

CRA marked World Consumer Rights Day (WCRD) through a public outreach event held from March 18-20, at the Katara Corniche, engaging directly with consumers to raise awareness about their rights and obligations related to their use of telecom services.

3 Participation in the ITU Council 2022 in Geneva

This is a significant event for ITU, held every four years to set the overall direction and structure of the Telecommunication Standardization Sector. CRA participated in WTSA-20 to stay informed of the general policy for the ITU-T Sector and the latest standard recommendations related to the ICT field. The CRA is keen to develop regulations that are in line with the best international standards in the field to ensure support for technological innovation and sustainable digital transformation in the State of Qatar.

4 Generation Connect Global Youth Summit 2022

A delegation from CRA participated in the Generation Connect Global Youth Summit 2022 organized by ITU under the theme: "Connecting the unconnected to achieve sustainable development" from June 2-4 in Kigali, Rwanda.

5 Global Spectrum Management Forum 2022

The Communications Regulatory Authority (CRA) participated in the Global Spectrum Management Forum 2022 hosted by the Central Radio Management Service (CRMS) of the Ministry of Science and ICT in Seoul, Republic of South Korea, from 6-7 September 2022.

6 Development, Cooperation and Technical Assistance Committee

Qatar chaired the meeting of the Development, Cooperation and Technical Assistance Committee under the CA (Council of Administrators) on the sidelines of the meeting of the Board of UPU Council of Administration (CA), held in Berne, Switzerland from May 16-20, 2022.

7 Third GCC Group Meeting to Prepare for the World Radiocommunication Conference

CRA participated in the Third Meeting of the GCC Group in Charge of Preparing for the World Radiocommunication Conference (June 2, 2022) - The meeting included discussions about the agenda items of the WRC-23 and several reports issued by working groups.

8 Meeting of the Board of Universal Postal Union Council of Administration

A Qatari delegation from the CRA and Qatar Postal Services (Qatar Post) participated in the annual meeting of the board of Universal Postal Union's (UPU) Council of Administration (CA), as a board member. The meeting's agenda included discussions on UPU's Global development cooperation strategy for 2022-2025. Through this Qatar contributes to shaping the future of the global postal sector, which will have a direct effect on the development of the postal sector in Qatar and other local sectors associated with postal services.

9 Qatar Participates in UPU Council of Administration Meeting

CRA and Qatar Postal Services Company (Qatar Post) participated in the annual meeting of the board of Universal Postal Union's (UPU) Council of Administration (CA). Through these meetings, the State of Qatar contributes to shaping the future of the global postal sector for the better, which will directly affect the development of the postal sector in Qatar and other local sectors associated with postal services.

10 Qatar Signs the Final Acts of the ITU Plenipotentiary Conference 2022

Qatar's delegation actively participated in the final plenary session of the International Telecommunication Union (ITU) Plenipotentiary Conference 2022 (PP-22) in Bucharest, Romania, from September 26 to October 14, 2022. The plenary session focused on signing the conference's final acts, which outline the vision and roadmap for the global ICT sector over the next four years until the next conference.

Highlight: **ITU Plenipotentiary Conference 2026**

Qatar has been unanimously selected to host the prestigious Plenipotentiary Conference of the International Telecommunication Union (ITU) in Doha, in 2026. This significant honour validates Qatar's global leadership in information and communication technologies and its adherence to international standards.

The Plenipotentiary Conference is the highest decision-making body of the ITU, setting the organization's strategic plan and budget every four years. These conferences serve as vital milestones on the global journey towards digital transformation, aligning with the United Nations' sustainable development priorities.

Qatar's selection to host the 2026 conference was ratified during the previous ITU Plenipotentiary Conference in Bucharest, Romania in September 2022. The decision reflects the country's strong record in hosting major international events, including previous ITU gatherings like the World Telecommunication Development Conference in 2006, the Connect Arab Summit in 2012, and the ITU Telecom World in 2014.

His Excellency Mohamed bin Ali Al Mannai, Qatar's Minister of Communications and Information Technology, graciously accepted the responsibility, reinforcing Qatar's readiness to host a successful conference.

The 2026 Plenipotentiary Conference will focus on accelerating digital uptake worldwide, a key element in achieving the United Nations Sustainable Development Goals and ensuring global connectivity by 2030. The ITU's latest data indicates a digital divide, with approximately a third of the world's population, or 2.7 billion people, still lacking internet access. The upcoming conference in Qatar will be a critical platform for addressing this challenge and setting the path for global digital inclusion before the 2030 target set by the United Nations to meet the Sustainable Development Goals.

Key Publications

1. CRA released the Spectrum Plan for FIFA World Cup Qatar 2022™, meeting FIFA's requirements, and ensuring efficient spectrum utilization during the tournament in collaboration with various sectors.

2. Two Amended Class Licenses were published for "Resale of Retail Telecommunications Services" and "Class License to Own and/or Operate a Private Telecommunications Network".

3. CRA published the Cloud Computing Handbook for SMEs, facilitating the safe adoption of cloud technology by SMEs in Qatar. It comprises an overview of cloud computing, contractual provisions, service categories, and key considerations. This supports Qatar's digital development strategy and promotes the country as a regional digital hub.

4. CRA published an audit of Ooredoo Qatar and Vodafone Qatar's mobile networks, assessing service quality and readiness for FIFA World Cup Qatar 2022™. The results show high standards and improved data throughput, with an emphasis on 5G networks. CRA clarifies the audit is not for provider comparison or promotion purposes.

5. CRA issued a Telecommunications License to Starlink Satellite Qatar, expanding service access in remote areas. Starlink will offer alternative telecom solutions and ensure backup communications during network outages, benefiting sectors including offshore oil and gas platforms and maritime transportation.

6. CRA issued a Regulation for the Standards for Government Telecom Duct Infrastructure Design and Construction – setting out technical requirements and standards related to the telecom duct infrastructure, which will be applied by all third parties involved in the planning, designing, construction, and installation of the ducts, including contractors and consultants for all government telecom duct infrastructure projects.

7. MCIT approved CRAs amendments to the Mobile Telecom Network Rollout and Coverage Obligations. We made these amendments to broaden its role related to enhancing the consumers' experience by improving the performance of mobile telecom networks and the quality of services provided to the consumers.

8 CRA launched a public consultation on 5G private mobile networks in Qatar, gathering stakeholder views on implementation and regulatory support for enterprises and government entities interested in adopting these networks. The consultation aims to address the needs and requirements of implementing 5G private networks.

9 In collaboration with Hamad Bin Khalifa University and Qatar University, CRA produced the National Blockchain Blueprint and published it on the CRA website for public consultation. The blueprint highlights how blockchain technology can contribute to building an innovative and growing IT sector in Qatar by increasing domestic and foreign investment. This will help enable a seamless transition towards smart Qatar, supporting Qatar National Vision 2030 (QNV) and the Qatar National Development Strategy.

10 CRA published a public consultation on its website related to the Wireless Local Area Network (Wi-Fi 6) and CRA's proposed policy for assigning the full frequency band (5925 - 7125 MHz) to this network with the aim of receiving views and comments from local and international stakeholders and interested parties.

11 CRA published the Cloud Policy Framework, following a comprehensive public consultation in 2021. This framework emphasizes effective collaboration between government entities and private stakeholders, including Cloud Services Providers, data center providers, infrastructure and connectivity providers, software developers, online platforms, and cloud users.

Financial Performance Snapshot

CRA has been given the responsibility to collect and transfer license fees and other fees as per Telecommunications Law number 34 of 2006. We may also levy fines and penalties for non-compliance. The total amount is transferred to the government accounts during the financial year.

CRA Revenue Growth (YoY in %)

2022

CRA Revenues (QAR)

2021	2022
442,300,799.21	476,534,822.88

Source of Revenues	2021	2022
License & Industry Fees (%)	85.1%	84.70%
Spectrum (%)	11.0%	10.92%
Numbering (%)	2.8%	2.68%
Financial Penalties (%)	0.8%	1.44%
Domain Related (%)	0.2%	0.27%

04 Highlight: FIFA World Cup Qatar 2022™

The Best World Cup Ever
Breaking all records

FIFA WORLD CUP Qatar2022

The Full Mondial - 64 Matches World Cup Stadia Statistics

1st 5g Enabled World Cup

Mobile Data 45.1 TB

Attendance 3.4 Million

Data 801

Voice 11.4 Million Calls

201 TB WiFi in Stadia

Biggest Sporting Event ever by Mobile Data Volume

8 Venues
500+ Experts
8,466 Antennae

5G 40.3% share
@ 236 Mbps
4G 58.2% 19Mbps

Volte 63.1% share
CssR 99.95%
CDR 0.04%

646 K Roamers inStadia

1. Lusail Stadium

222 TB
2.9 M Calls

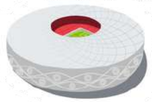
2. Al Bayt Stadium

162 TB
2.4 M Calls

3. Khalifa International Stadium

84 TB
1.3M Calls

4. Al Thumama Stadium



83 TB
1.4 M Calls

5. Stadium 974

64TB
773K Calls

6. Education City Stadium

77 TB
1.13 M Calls

7. Ahmad Bin Ali Stadium

56 TB
713 K Calls

8. Al Janoub Stadium

53 TB
817 K Calls

The hosting of the FIFA World Cup 2022™ in Qatar propelled the nation to new heights in telecommunications technology. The Communications Regulatory Authority (CRA), service providers, and other stakeholders effectively managed high-bandwidth demands to ensure seamless streaming of the events. The term 'FIFA World Cup 2022™' became the most searched term on Google during the tournament finals, reflecting the event's success and global reach.

Spectrum Management

Our Spectrum Management team diligently undertook several projects to ensure that global standards on spectrum allocation and maintenance were not only met but surpassed:

- **AFMS System Upgrade:** To comply with FIFA requirements for the FWC 2022, the Automated Frequency Management System (AFMS) was enhanced and implemented.
- **Nationwide ASMS Augmentation:** The Automated Spectrum Monitoring System (ASMS) was bolstered to ensure thorough monitoring of coverage at all venues during the FIFA World Cup. This was achieved with the integration of 7 Hybrid Stations, 14 TDOA sensors, 2 Transportable TDOA sensors, and 2 Mobile Monitoring Stations. Additionally, 4 Automatic Direction Finders and 4 Spectrum Analyzers were utilized.
- **Space Radio Monitoring Centre (SRMC):** The SRMC monitored GSO/NGSO satellites within the visible arc, identified and geolocated transmitters, and tracked Mobile VSAT terminals.
- **Drone Detection System (DDS):** The DDS reliably detected, classified, and located unauthorized radio-controlled drones and their operators within the shield area during high-profile events. The 868 MHz, 2.4 GHz, and 5.8 GHz frequency bands were most commonly used for drone operations during the tournament. CRA ensured the use of these frequencies did not interfere with other crucial communication services, striking a balance between the innovative use of drone technology and the seamless execution of the tournament.
- **Assistive Listening System (ALS) Installation**: ALS was installed with the aim of enabling individuals with hearing impairments to fully immerse themselves in the stadium atmosphere. The CRA dedicated the frequency range of 863 – 865 MHz exclusively for the ALS system throughout all FIFA World Cup stadiums. This decision was based on the need to safeguard this frequency range, which is generally used for short-range devices, from any potential harmful interference. As a result, individual private mobile radio frequency licenses (PMR Area Based) were issued for each stadium.
- **Smart Analytics and Remote Probes:** Remote Quality of Service (QoS) measurements of mobile networks were carried out in all stadiums and major venues.
- **Mobile KPI Monitoring Dashboard:** A centralized dashboard was created to remotely monitor the Key Performance Indicators (KPIs) of both service providers in near real-time.
- **FWC Manpower Project:** For the duration of the FIFA World Cup 2022, 90 temporary staff members were deployed to the Spectrum division to carry out CRA's mandates.

Spectrum Team Involvement in FIFA World Cup 2022™

- Issuance of the updated version of the Spectrum Plan for FIFA World Cup Qatar 2022™.
- Successful deployment of Spectrum management teams for pre-event & event monitoring at FIFA World Cup Qatar 2022™.
- Successful coordination with the Supreme Council and the General Authority of Customs to ensure efficient implementation of the Sports Events Management System (SEMS).
- Coordination to implement the agreed GCC (GSO) common standards for Vehicle Broadcast Receivers (mainly T-DAB).
- Issuance of the Class License for use by the RLAN devices over the 5925 - 6425 MHz band, along with Policy Statement on Wi-Fi 6E.
- Successfully completed QoS data collection for Network Audit 2022 by October 2022.
- Decision and Order for Provisioning of equipment and services for QoS monitoring (Test SIM cards for probes)

The Spectrum Test and Tag Desk, managed by the CRA, was one of twelve at the main venues dedicated to providing the service of testing and tagging radio equipment for authorization to enter the tournament's venues. No radio devices or equipment were allowed in the official FIFA World Cup Qatar 2022™ venues unless registered on the e-spectrum portal and tested and tagged by the CRA.

In a context where a wide range of wireless applications and devices are deployed within a limited space, the Spectrum Test and Tag Desk ensured all radio spectrum requirements were met and maintained seamless communication without radio interference.

This included handling cases of radio interference that required immediate action. The Spectrum Desk thus ensured the smooth operation of various radiocommunications and broadcasting services, contributing significantly to the success of the tournament.

Key Spectrum Metrics

Frequencies	4,402
Licenses Issued	807
Licenses Amended	230
Licenses Cancelled	199
Licenses Renewed	6,255
Type Approval	1,794
Import Authorization Issued	270
Import Authorization Amended	576
Import Authorization Cancelled	48
Import Authorization Renewed	511
Customs Clearance	32,734
Interference – Local	81
Interference – from/to GCC	7
Radio Frequency Emission	1
Quality of Service (QoS) Investigation	5

Qatar's Spectrum Management Prospects Unleashed

Spectrum management, particularly the process of frequency assignment, re-allocation, and monitoring, was a complex task during the FIFA World Cup Qatar 2022™. Overcoming the challenge of managing frequencies in a relatively small geographical area with a large number of users of radio devices and equipment was a significant accomplishment and one that has been recognized by stakeholders, including FIFA.

Despite the extensive experience in spectrum management for tournaments and events prior to the World Cup and the Arab Cup, managing the frequency spectrum for these tournaments provided a unique and distinctive experience that has further prepared us for hosting major future events such as the Olympic Games. Our approach to spectrum management has become a model for other countries set to host major tournaments, such as France, the host of the 2024 Summer Olympic Games™ in Paris. This has generated interest from several countries wishing to learn from our experience in this unique field.

Extensive collaboration and coordination with local and international stakeholders and spectrum applicants, along with the development of regulatory tools and spectrum management processes, were crucial to the successful execution of our responsibilities as the radio spectrum service provider during the tournament. As the competent authority for managing, allocating, licensing, and monitoring the use of the frequency spectrum in the State of Qatar, we contributed significantly to the tournament's success.

In order to ensure the best services for public mobile communications networks during the tournament, we updated the relevant regulatory tools and granted service providers the necessary licenses to use the frequency spectrum. We also closely monitored service providers' compliance with requirements. Allowing investment in modernizing and developing network infrastructure and the use of the latest technologies by service providers resulted in an unprecedented volume of data usage via mobile networks.

CRA allocated and made available the lower part of the 6 GHz band (5925-6425 MHz) for the use of RLAN devices, as part of the Class Licensing regime set in the Applicable Regulatory Framework (ARF). The allocation was based on the findings from the public consultation on "Class License for use of RLAN devices over (5925-7125 MHz) band (Wi-Fi 6E)" conducted in 2021.

While we are committed to the support the allocation of the entire 6Ghz band for the use of RLAN devices, the final policy will be set pending the outcome of discussions on the upper part of the 6 GHz band (6425 – 7125 MHz) on its potential use for International Mobile Telecommunications, at the World Radiocommunication Conference 2023.

We acknowledge the exponential growth in data traffic and the inability of the current Wi-Fi spectrum to offer sufficiently wide channels for new applications that complement the 5G ecosystem. However, we believe there is sufficient spectrum available across the lower, mid and high bands that can address the current and future needs of 5G deployment. Wi-Fi6 and 5G are complementary and therefore there is a need to provide an opportunity for the development of both technologies.

Looking to the future, we are committed to applying the valuable experience and insights gained from this tournament to further refine our spectrum management processes and regulatory tools, ultimately enhancing the quality of wireless communications in Qatar and maintaining our reputation as a leading model for other countries.

Further to this, we are actively preparing to develop a comprehensive spectrum plan for upcoming events, including the Formula 1 Championship and the Asian Cup 2023. Our commitment is to ensure that these future events are as successful and smoothly run as the World Cup, demonstrating our ongoing dedication to excellence in spectrum management.

Projects Supporting FIFA World Cup 2022™

Within the FIFA zone boundary, a total of 12 projects were undertaken, focusing on the construction of the passive government telecom infrastructure network, managed by the CRA. To ensure timely completion and minimize disruption during the World Cup, we collaborated closely with relevant authorities.

As a result of diligent coordination, 10 out of the 12 major projects have been successfully completed and handed over to the CRA.

The list of projects is as follows:

1. Expressway
Wakrah Bypass Road - Completed - Al Wakrah Municipality - Nearest FIFA Stadium (Al Janoub)

2. New Salata
Completed - Doha Municipality - Nearest FIFA Stadium (Al Thumana)

3. Aziziya-Salwa Road
Completed - Doha Municipality - Nearest FIFA Stadium (Khalifa)

4. North of Mall of Qatar
Completed - Doha Municipality - Nearest FIFA Stadium (Ahmad Bin Ali)

5. Wakrah West
Completed - Al Wakrah Municipality - Nearest FIFA Stadium (Al Janoub)

6. Barwa to Wakrah Main Road
Completed - Al Wakrah Municipality - Nearest FIFA Stadium (Al Janoub)

7. Mall of Qatar
Completed - Doha Municipality - Nearest FIFA Stadium (Ahmad Bin Ali)

8. West Mauther
Completed - Doha Municipality - Nearest FIFA Stadium (Khalifa)

9. West of Al Mehsaf
Completed - Al Wakrah Municipality - Nearest FIFA Stadium (Al Janoub)

10. Al Rayan Stadium Support Works
Completed - Doha Municipality - Nearest FIFA Stadium (Ahmad Bin Ali)

11. Al Egda Al Heedan and Al Khor
Under Construction - Al Khor Municipality - Nearest FIFA Stadium (Al Bayt)

12. East-of-Al Shafi
Design - Al Rayyan - Nearest FIFA Stadium (Khalifa)

The CRA played a proactive role throughout the process, conducting regular site inspections and closely monitoring the projects during both the construction and handover phases. This rigorous oversight ensured that the tournament remained unaffected by any ongoing construction activities.

Security Enhancements

- Enabled the Volumetric and Cloud Signaling DDoS service provided by Ooredoo.
- "Tenable software" to identify system vulnerabilities.
- Signed a special contract with a registry system vendor to provide support and monitor the system during the World Cup.
- Cooperation with the National Cyber Security Agency.

Telephone Number Allocation

To accommodate the surge in demand during the FIFA World Cup 2022™, 2.6 million mobile and 37,000 fixed-line numbers were allocated.

Mobile Numbers Allocated to Ooredoo	Fixed Line Numbers Allocated to Ooredoo
1,800,000	**37,000**
2022	**2022**
Mobile Numbers Allocated to Vodafone	**Fixed Line Numbers Allocated to Vodafone**
800,000	**0**
2022	**2022**

Supporting Measures

During the FIFA World Cup 2022™, CRA's Technical team undertook the following supportive measures:

- **Mobile Site Release and Inspection:** The team released 580 mobile sites for both service providers and carried out inspections on more than 1,000 sites.
- **Road Requests and Infrastructure Design Reviews:** The team reviewed and approved over 7,500 open road requests and infrastructure design reviews.
- **FastTrack Approvals:** The team facilitated FastTrack approvals through the Duct Management System for network connections to stadiums and customers.
- **In-Building Wiring Standard:** From a regulatory perspective, the team issued the In-Building Wiring Standard.
- **Telecom Duct and Infrastructure Design and Construction Standards:** The team released standards for government telecom duct and infrastructure design and construction.
- **ArcGIS Solutions Integration:** The team successfully activated and integrated ArcGIS Solutions.

Through the course of 2022 we carried out the following tasks linked to the World Cup:

Issued more than 25,000 authorizations for radio applications and equipment.

Tested and tagged more than 20,000 items of radio equipment.

Assigned more than 3,700 radio frequencies to all parties.

We achieved the following performance against key metrics:

Daily Average of Mobile Services Usage During FIFA World Cup 2022

Data Usage of 2828 TB,

Download speed - 22Mbps (4G) and 276 Mbps (5G)
Upload speed - 4Mbps (4G) and 15Mbps (5G)
Voice call volume - 43 M mins with call success rate of 99.8%

Mobile Services Usage during FIFA World Cup 2022 at Stadium

Data Usage of 1428 TB

Download Speed – 250 Mbps (5G)
Upload Speed – 63 Mbps (5G)
Voice call Volume – 19 M mins

Mobile Data

Mobile Data Consumption during FIFA World Cup 2022™ by Service Providers (across Stadiums)

Lusail Stadium

ooredoo	vodafone
222 (TB)	305 (TB)

TOTAL: 527 (TB)

Al Bayt Stadium

ooredoo	vodafone
162 (TB)	132 (TB)

TOTAL: 294 (TB)

Khalifa International Stadium

ooredoo	vodafone
84 (TB)	192 (TB)

TOTAL: 276 (TB)

Al Thumama Stadium

ooredoo	vodafone
83 (TB)	186 (TB)

TOTAL: 269 (TB)

Education City Stadium

ooredoo	vodafone
77 (TB)	94 (TB)

TOTAL: 171 (TB)

Stadium 974

ooredoo	vodafone
64 (TB)	91 (TB)

TOTAL: 155 (TB)

Ahmad Bin Ali Stadium

ooredoo	vodafone
56 (TB)	99 (TB)

TOTAL: 155 (TB)

Al Janoub Stadium

ooredoo	vodafone
53 (TB)	88 (TB)

TOTAL: 141 (TB)

Total Mobile Data Consumption

ooredoo	vodafone	TOTAL
TOTAL 801 (TB)	TOTAL 1,187 (TB)	1,988 (TB)

Percentage per provider

Voice Call Numbers

Voice Call Numbers (min) during FIFA World Cup 2022™ by Service Providers (across Stadiums)

Lusail Stadium

ooredoo	vodafone
2.90 (M)	3.35 (M)

TOTAL: 6.25 (M)

Al Bayt Stadium

ooredoo	vodafone
2.40 (M)	2.13 (M)

TOTAL: 4.53 (M)

Khalifa International Stadium

ooredoo	vodafone
1.30 (M)	2.43 (M)

TOTAL: 3.73 (M)

Al Thumama Stadium

ooredoo	vodafone
1.40 (M)	2.09 (M)

TOTAL: 3.49 (M)

Education City Stadium

ooredoo	vodafone
1.13 (M)	1.27 (M)

TOTAL: 2.40 (M)

Stadium 974

ooredoo	vodafone
0.77 (M)	1.38 (M)

TOTAL: 2.15 (M)

Ahmad Bin Ali Stadium

ooredoo	vodafone
0.71 (M)	1.03 (M)

TOTAL: 1.74 (M)

Al Janoub Stadium

ooredoo	vodafone
0.82 (M)	1.34 (M)

TOTAL: 2.16 (M)

Percentage per provider

Ooredoo 43%

Vodafone 57%

Calls per spectator

7.8 (M)

SIM Card Activation

The CRA, in cooperation with Ooredoo Qatar and Vodafone Qatar, and other stakeholders, revised the registration procedures for obtaining prepaid SIM cards during the World Cup. The aim was to improve the consumer experience for mobile communication services while ensuring regulatory compliance.

The updated process facilitated the fans to register for these services remotely. They could apply for a SIM card online through the digital channels of the service providers and verify their identity digitally using the "Hayya" card as the applicant's identification document. This enabled fans to either instantly obtain an embedded SIM (e-SIM) card without the need to visit the service providers' retail outlets or procure a physical SIM card from the retail outlets in Qatar, based on their preference.

SIM Activations During the World Cup (2022)

Total FAN SIMs Activated **655,422**	Digital AI based remotely activated FAN SIM **116,810**
FAN SIMs by Provider: Ooredoo **270,293**	FAN SIMs by Provider: Vodafone **395,129**

Role of the International Broadcast Centre (IBC)

The International Broadcast Centre (IBC) played a pivotal role in the FIFA World Cup Qatar 2022 by transmitting all related broadcast content to audiences worldwide.

As the central hub for all TV and radio broadcasting of the tournament, the IBC, together with the host broadcaster, Host Broadcasting Services (HBS), produced and distributed live feeds of all 64 matches. HBS relied heavily on the Eutelsat and Asiasat systems for their global broadcasts. These two satellites were instrumental in establishing satellite broadcasting links to and from the IBC, ensuring seamless and uninterrupted transmission of content.

In addition to Eutelsat and Asiasat, many rights-holding broadcasters also utilized a range of other satellite systems to facilitate their unique broadcasts. These included Intelsat, Astra, Arabsat, and Suhail Sat. The use of these diverse satellite systems highlighted the global nature of the tournament and the extensive technical infrastructure needed to cater to different broadcasters and their specific audience needs.

The IBC was strategically located at the heart of Qatar Foundation's Education City, a renowned complex of universities and research institutes, spanning an area of 85,000 square meters, and providing dedicated space for 3,000 media and broadcast professionals.

The International Broadcast Centre's success during the World Cup has set a new standard for future international sports events. Its achievements are a testament to the potential of advanced technology and infrastructure in facilitating global communication. As part of our commitment to fostering connectivity and collaboration at the CRA, we are proud to have been associated with this landmark event and look forward to supporting similar initiatives in the future.

Industry Collaboration

Cisco played a pivotal role in enabling the success of the FIFA World Cup 2022™ by providing crucial backend infrastructure and support to stadiums, data centers, broadcasters, and security operations. Their innovative edge cloud solutions for content delivery significantly enhanced the connected digital fan experience during the World Cup, and their dedicated team worked tirelessly, providing 24x7 support throughout the event.

"We were one of the first vendors to open an office in Qatar — underlining our belief in the country's vision a long time before the FIFA World Cup 2022™." — Cisco Q&A

MEEZA has played a pivotal role in the growth of Qatar's ICT sector by offering innovative cybersecurity solutions, next-generation private cloud services, and expertise in managing multi-cloud environments. Qatar's hosting of the FIFA World Cup 2022™ resulted in a surge in demand for technology solutions and services, and MEEZA was able to respond by providing innovative solutions and services to support the event, including managed services, data center services, cloud services, IT security services, and application management.

"The FIFA World Cup boosted various sectors, including technology and telecommunications. MEEZA was able to leverage this increased demand for IT services and infrastructure in the lead-up to the event." — MEEZA Q&A

As a global leader in 5G technologies, Huawei has played a crucial role in contributing to Qatar's modern ICT infrastructure. During the FIFA World Cup 2022™, Huawei successfully delivered multiple projects for the Supreme Committee. The company played a vital role in ensuring smooth network operation, maintaining service quality, and upholding security throughout the event.

Leveraging advanced AI technologies and digital platforms, Huawei worked closely with operators to achieve a 100% event recovery SLA fulfillment rate, delivering a seamless user experience. Huawei's critical backup power solutions also played a crucial role in ensuring uninterrupted operations in FIFA stadiums and Fan Zones.

"It is no wonder that Qatar is one of the best places to lead a business. With strong potential and stability in the market, the country welcomes foreign participation in joint ventures through technology supply, market administration, and equity participation." — Huawei Q&A

Vodafone has played a vital role in Qatar's position as a host of world-class sporting events. Through its superior network coverage, Vodafone ensured seamless connectivity during high-profile tournaments, including the FIFA World Cup Qatar 2022™. During the tournament, Vodafone delivered exceptional results, with 1.8 million roaming customers benefiting from its network, approximately 15 million calls made, and a staggering 1,188 TB of data consumed at matches. Analysis firm Ookla recognized Vodafone Qatar as the "World's Fastest Mobile Network" in H2 of 2022, setting a new global benchmark for mobile network speeds. Vodafone's commitment to network investment has strengthened Qatar's standing as a global leader in mobile internet connectivity and coverage.

"The key driver of our continued success as a technology leader in Qatar has been our unwavering commitment to understanding, valuing, and empowering our customers via world-class digital experiences." — Vodafone Q&A

05 Shaping the Future through Dynamic Regulatory Practices

Qatar's emergence as a regional leader in emerging technologies, exemplified by its leadership in deploying 5G and cloud technology, has attracted entrepreneurs and investors from around the world.

Demonstrating its commitment to progress and innovation, Qatar showcased numerous technological advancements during the FIFA World Cup 2022™, delivering unparalleled experiences to both local and international fans.

Building upon this foundation, Qatar has made significant progress in digital transformation, adopting cloud-based business models and strengthening cybersecurity measures. To navigate the complexities of digital growth, effective regulation is crucial, striking the right balance between control and innovation.

Focus Areas to Foster Digital Growth

The CRA is dedicated to facilitating technological growth, fostering an environment of trust, and promoting the public good. The focus areas to foster digital growth align with the Qatar National Vision 2030, aiming to catalyze the digital economy's contribution to Qatar's GDP.

We aim to foster innovation, competition, and international cooperation while promoting sustainable ICT practices. Successful collaboration with local businesses, technology providers, and stakeholders empowers Qatar's digital industries, supported by skilled talent and monitored through key industry indicators.

Enhancing Connectivity

Connectivity plays a vital role in Qatar's digital journey. Qatar's commitment to low-latency connectivity and data sovereignty is evident through the establishment of new cloud regions, expansion of data centers, and deployment of 5G. These steps enable businesses to securely store and process data within the country, fostering growth in cloud and edge computing services. The CRA aims to address connectivity costs, further propelling Qatar's digital transformation and enhancing organizational agility, scalability, and innovation capabilities, as well as addressing concerns regarding "fair share" between content creators and Internet Service Providers (ISPs).

Data-Driven Technologies

We prioritize data-driven technologies, particularly with the increasing use of AI and AI-based tools. Qatar's National Vision 2030 positions the country as a technology hub, emphasizing goals like achieving a cashless economy and encouraging companies to embrace new technologies. Collaborations with industry leaders like Microsoft Azure and Google Cloud empower organizations to expedite their digital transformation, leveraging cutting-edge services. Vodafone's partnership with Nokia brings advanced fiber technology to Qatar, showcasing the country's technological advancement.

Encouraging Innovation and Competition

We aim to foster a competitive environment that encourages innovation — streamlining regulatory processes and creating policies that promote competition, prevent monopolies, and protect consumers. For instance, the CRA has been working on regulations for Over-The-Top (OTT) services to create a level playing field for all market players.

Boosting Mobile Connectivity

To meet increasing mobile connectivity demands, the CRA is actively securing additional spectrum in the mid-band (2.3 GHz, 2.6 GHz, and 6 GHz). We are also focused on fostering the growth of Wi-Fi 6 technology as a complement to the 5G ecosystem. Looking ahead, we envision utilizing the complete 6 GHz band (5925-7125 MHz) for RLAN devices and addressing future 5G deployment needs across lower, mid, and high bands. Recognizing the economic potential, our approach considers the significant opportunities this band holds for the State of Qatar. In addition, the CRA is proactively revising and amending the Network Roll-out and Coverage Obligations, set to be completed by 2026. We will engage in discussions with service providers (SPs) to ensure agreement on the new obligations, aiming to optimize network deployment and coverage.

Strengthening International Cooperation

In the era of globalization, cooperation at the international level is essential to address issues such as cross-border data flow, global cybersecurity threats, and harmonization of standards. We actively participate in international and regional forums and collaborate with other regulatory authorities to share knowledge and tackle common issues.

Promoting Sustainable ICT

We recognize the role of ICT in achieving the Sustainable Development Goals (SDGs), encouraging companies to adopt green ICT practices and leverage technology to address environmental challenges — as well as harnessing ICT to promote social development and inclusivity.

Empowering Local Industries through Innovation

The CRA plays a pivotal role in fostering a regulatory environment conducive to innovation, facilitating access to advanced technology, and supporting the development of digital infrastructure. We encourage collaboration, knowledge exchange, and partnerships among local businesses, technology providers, and stakeholders — empowering Qatar's digital industries, including developers and startups.

Developing Skilled Talent

The Qatari government's goal is to develop a skilled workforce. We collaborate with technology providers and stakeholders to support the training, upskilling, and reskilling of local talent. Technology providers are encouraged to continue offering upskilling courses through “center of excellence” initiatives in all emerging technology fields.

Monitoring and Measurement of the ICT Sector

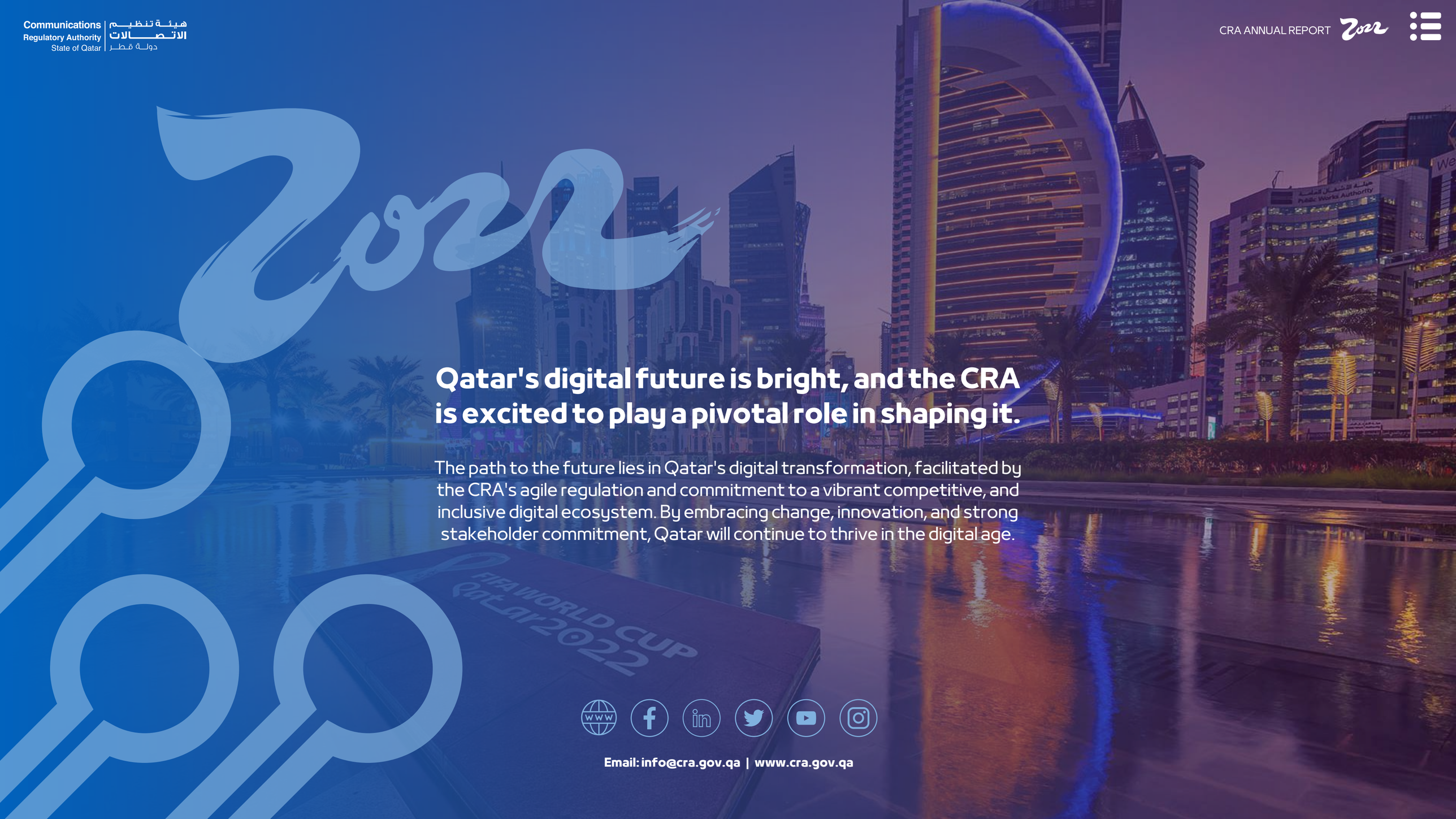
The CRA, in partnership with the Planning and Statistics Authority and other stakeholders, monitors key industry indicators to ensure accurate data about sector participants is captured. The adoption of open data publishing enhances transparency, promotes collaboration, and facilitates informed decision-making — fostering innovation, economic growth, and development.

Consultation with the ICT Industry

To cultivate a viable and sustainable digital sector in Qatar, we host regular workshops with the ICT industry and service providers. The focus of these engagements is on addressing various aspects of their businesses and developing a regulatory ecosystem that keeps pace with global ICT innovations, particularly in areas related to spectrum, IPV6 adoption, IXP expansion, and IT market expansion.

Partnerships and Technology Thought Leadership

The CRA maintains collaborations with technology partners, academia, accelerators, incubators, and research institutions. Together, we conduct in-depth studies, analyses, and thought leadership forums to explore the implications of cutting-edge technologies like AI, ML, and intelligent edge computing across various sectors. This collaboration fosters the localization of ICT innovation in Qatar.



Qatar's digital future is bright, and the CRA is excited to play a pivotal role in shaping it.

The path to the future lies in Qatar's digital transformation, facilitated by the CRA's agile regulation and commitment to a vibrant competitive, and inclusive digital ecosystem. By embracing change, innovation, and strong stakeholder commitment, Qatar will continue to thrive in the digital age.

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