CRA

Building a **digital future** for Qatar

ANNUAL REPORT 2021

Communications هيئـة تنظيـم
Regulatory Authority الاتصـــالات
State of Qatar دولـة قطـر

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

His Highness
Sheikh Hamad bin Khalifa Al Thani
The Father Emir

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CRA 2021
Overview

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"The CRA shall regulate the communications and information technology sector, the postal sector, and access to digital media."

Emiri Decree No. 42 of 2014.

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Message from the Minister of Communications and Information Technology

HE Mohamed bin Ali Al Mannai

Leveraging world-class infrastructure to build a sustainable digital economy for Qatar.

It has been more than 15 years since Qatar's leadership established the nation's ICT policy and regulatory body. While the ICT landscape has changed dramatically over those years, what hasn't changed is the need to support Qatar's National Vision and National Development Strategies by continuing to build the foundation for digital transformation that will help to diversify Qatar into a knowledge-based economy.

To ensure continued progress towards this goal, in 2021, Qatar enhanced the governance structure for the ICT sector. The Ministry of Communications and Information Technology was re-established as the policy maker and market developer; the independent Communications Regulatory Authority (CRA), in its 7th year of existence, remains as the independent regulator to promote and support an open and competitive ICT sector; and a new independent National Agency for Cyber Security was founded.

This annual report will detail the progress made in 2021 toward implementing the Communications Regulatory Authority's 2020-2024 strategy across the full range of our mandate including the IT, Telecom, Access to Digital Media, and Postal sectors.

To name just a few headline accomplishments, the ICT sector increased its contribution to Qatar's GDP by 7.6%, totaling QAR 10.3 billion; and by Q4 2020, 5G coverage reached just under 100 percent of Qatar's population.

We are particularly proud of the many signs of acceleration in the digital ecosystem and the significant investments in data centers and cloud infrastructure made by both global and local companies. Private investment in innovative startups in fintech, e-sports, and delivery technology increased during 2021. According to a study by KPMG, total venture funding in Qatar grew by 92% when compared to 2020.

The world has recognized Qatar's progress. The World Economic Forum's 2020 Global Competitiveness Report ranks Qatar among the top 10 countries in adopting ICT, digital skills, and a digital legal framework.

While it is important to look back and assess where things stand, it is even more important to look ahead — to be clear about our priorities and honest about the challenges we face, allowing us to turn those challenges into opportunities.

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In 2022, CRA will focus on delivering on Qatar's commitment to the most technologically advanced communications services for the FIFA World Cup™, demonstrating the use of advanced broadcast equipment, infrastructure, and live streaming services to the visitors we will host, as well as the wider global viewing audience.

We will also continue to progress through 2022 and beyond on our main strategic priority — expanding the IT sector in order to meet the growing demand for digital products and services from businesses and consumers alike. Our goal is to increase the size of the sector by 50 percent by 2024.

As we look back on a successful year, I continue to be inspired by our nation's bold leadership and its commitment to a digital economy and ambitious digital agenda based on innovation and investment, and I continue to be impressed by the dedication and talent of our staff.

There will be several other areas of future focus. By the end of 2022, we will publish the first comprehensive ICT sector study which will set the parameters for achieving this goal.

After spending 2021 consulting with key stakeholders, CRA will publish the Cloud Policy Framework in 2022. This policy will create a solid foundation for achieving the ambitious goal of establishing Qatar as a digital hub in the region and will strengthen the presence of international cloud and digital platform providers, expanding the supply of digital services in Qatar and beyond its borders.

We will continue to put in place the regulatory framework for emerging technologies — to further attract increased foreign and domestic investment and to enable digital innovation in Qatar as part of the national goal to diversify the economy.

Our greatest challenge will be to build on Qatar's substantial investment in state-of-the-art infrastructure — ensuring that our policy framework strikes the right balance between facilitating the growth of the sector while at the same time ensuring a competitive market landscape and protecting consumer rights and privacy.

Anticipating the future during a time of global economic uncertainty will test our imagination, creativity, and resilience. But with all stakeholders working together, I have absolute confidence that we will continue to position Qatar as a leading innovation and digital hub.

HE Mohamed bin Ali Al Mannai
Minister of Communications and
Information Technology

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Our Focus

Our current focus is to facilitate economic diversification and greater innovation and investment in ICT, that enhance the competitiveness and attractiveness of the State of Qatar as a regional hub for global technology and communications services. While over the past decade CRA has created a strong framework to support the establishment of the country's world-leading telecommunications infrastructure, our current focus has shifted to the IT sector as a key enabler of digital growth.

CRA is committed to enabling a business-friendly ecosystem for the ICT 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 and enforcement of communications, competition, and consumer protection laws.

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.

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Our Remit

As the sector regulator in Qatar, CRA's remit is to promote and support open and competitive ICT and postal sectors that provide 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.

لحمـــاية المســتهلك
وتعزيــز المنافســة
Protecting Consumers & Promoting Competition

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.

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2021
Year at a glance

The global appetite for hydrocarbons, the revival of domestic demand, and the ongoing preparations for the FIFA World Cup 2022™ show that Qatar's future economic growth is expected to remain strong. This continued expansion will be a major driver of the state's efforts to diversify and transform into a leading knowledge-driven economy.

A new focus on ICT and cybersecurity

In 2021 HH the Amir established the Ministry of Communications and Information Technology as part of a Cabinet reshuffle. The new ministry, led by HE Minister Mohammed Al Mannai, is responsible for policy-making, ICT market and digital economy development, securing investment for the sector, as well as increasing public awareness about digital technologies.

This was complemented by the establishment of the National Cybersecurity Agency (NACA), an independent entity reporting to the Cabinet. Led by Abdulrahman Al-Malki, NACA is responsible for Qatar's national cyber security.

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Increased GDP contribution and inbound investment

In 2021 the ICT sector increased its contribution to GDP by **7.6%**, totaling **QAR 10.3 billion**

1.6%
of Qatar's total GDP.

While the sector's contribution to the economy is still small in comparison with relevant peers, CRA has put in place a strategic target to grow it substantially over the coming years.

Since **2016**, telecom service providers in Qatar have invested a total of QAR

6.6 billion

in CAPEX into cutting-edge telecoms infrastructure.

During **2021** alone, the two primary operators – Vodafone and Ooredoo – invested QAR

1.2 billion = 11.6%

of their annual revenues- into CAPEX.

▶ This continued investment has contributed significantly to Qatar's leading position in developing world-class ICT infrastructure.

Competitive Global Rankings

Qatar has shown remarkable progress in improving its digital infrastructure and increasing global competitiveness, resulting in the following rankings.

3rd
For mobile broadband speed by country

5th
Fastest country for median 5G download speed

5th
For 5G availability by country

17th
In the Global Competitiveness Report

27th
On the Global Cyber Security Index

29th
In Global Digital Competitiveness

37th
For fixed broadband speed by country

42nd
On the Global Network Readiness Index

Sources: Ookla, Hukoomi, NCS, IMD, NRI, Invest Qatar

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Key metrics
Snapshot: Key Indicators (2021)

|			
ICT Sector Contribution (QAR Billion) **12.4 Bn** 1.6% of total GDP	5G Availability Global Ranking (% Coverage) **5th**	Mobile Voice: (% Population Subscription, Q4, 2021) **145%**	Mobile Data: (% Population Subscription, Q4, 2021) **145%**
Broadband Fiber Subscriptions (Q4, 2021) **93%**	Subscriptions above 30 Mbps (Q4, 2021) **92%**	Fixed Broadband Subscriptions (per 100 inhabitants) **10**	Total Fixed Broadband Subscriptions **296,126**
International Bandwidth per User **184 Kb/s**	Network Readiness Index (130 countries) **42nd**	NCI Cybersecurity Ranking **49th**	Internet Access in Schools Ranking **1st**
Digital Competitive-ness Ranking (69 countries) **16th**	Investment in Emerging Technologies Ranking **17th**	Legal Framework's Adaptability to Emerging Technolo-gies Ranking **22nd**	E-commerce Legislation Ranking **1st**
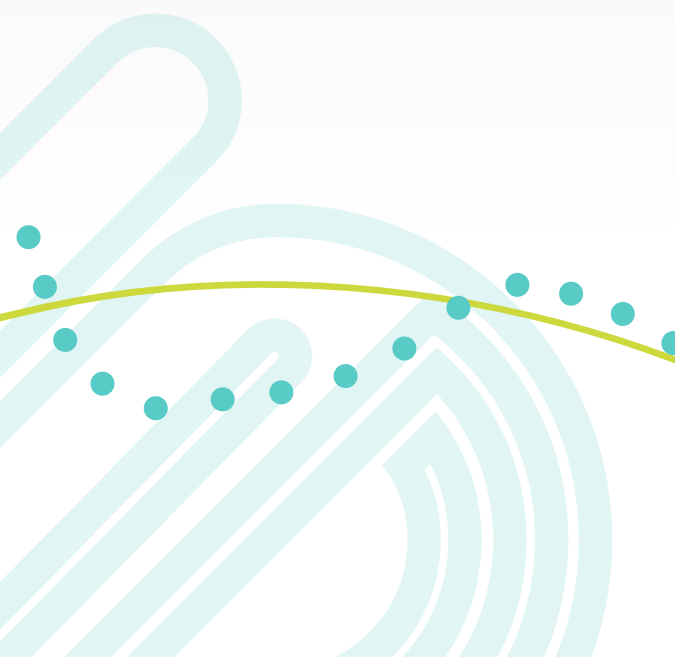
Investment levels

Qatar's strategy is driven by an ambition to diversify away from the conventional hydrocarbon-based economy. Qatar has strived to create an appropriate investment ecosystem. In 2021 the United States, Switzerland, Cyprus, Kuwait, Canada, Germany, and India were the leading source of FDI in Qatar accounting for almost 77% of the total investments.

Software, IT services, and communications combined were the highest job creators from FDI, accounting for almost 25% of the total jobs created by FDI in Qatar.

Software and IT services accounted for the second highest level of investment in CAPEX at
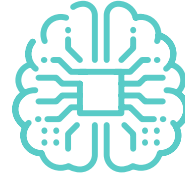
QAR 678 million

(17% of total Capex spent) and the number of projects (21).
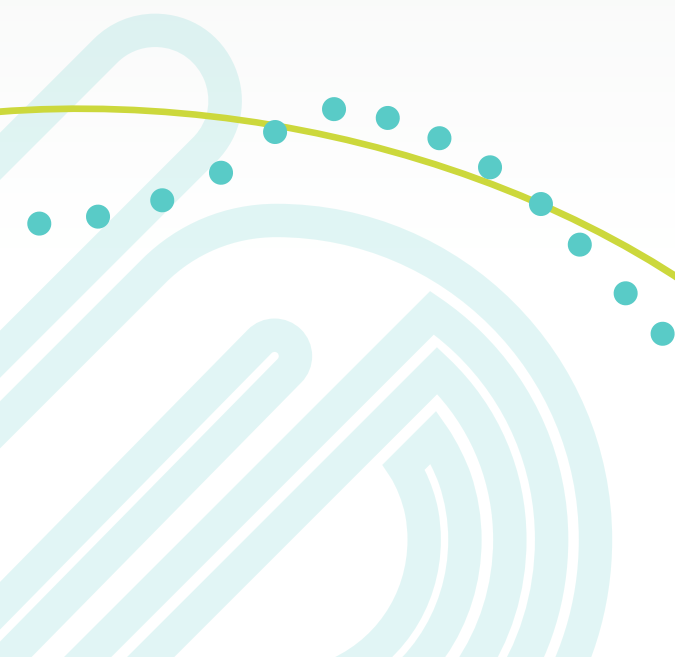
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The four pillars of the CRA

IT

Create a strong foundation for an innovative and growing IT sector that attracts increased domestic and foreign investment.

Telecom

Achieve a more competitive and innovative telecommunications sector that supports the country's development objectives.

ADM

Strengthen the regulatory regime to support the supply and adoption of digital media.

Postal

Develop a sustainable postal sector that meets the needs of customers and the national economy.

Progress on the CRA Strategy

During 2021 CRA continued to implement the 5-year strategy outlined in the Strategy Document 2020-2024, designed in alignment with Qatar's National Vision 2030 (QNV 2030) and the National Development Strategy (NDS2).

The Strategy Document is built on four pillars: IT, Telecom, Access to Digital Media (ADM), and Postal to cover the full breadth of the CRA mandate. It establishes a strategic objective for each of these four sectors, defines targets, and translates them into strategic initiatives to be implemented over a time period of five years.

In 2021 we made significant progress on these initiatives, key highlights of which are shared in the following pages.

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IT Sector

Objective: To create a strong foundation for an innovative and growing IT sector that attracts increased domestic and foreign investment.

## Increasing the contribution of the IT sector to GDP

CRA launched a comprehensive sector research study aimed at establishing sector taxonomy and measurements, as well as collecting data and insights to serve as inputs to deeper assessments of the local market and its maturity, and to baseline the next steps towards implementing fundamental changes to increase the contribution of the IT sector to GDP by 50%, a target we expect to meet in 2024. The findings from this large-scale research work will be completed and published in 2022.

In addition, we implemented a number of new policies through 2021, detailed in full later in this report, designed to nurture entrepreneurship and attract investment and collaboration from international technology providers, which will fuel the growth of the IT sector, further increasing its contribution to Qatar's GDP.

Facilitating growth in cloud computing

CRA published a public consultation on the Cloud Policy framework, to gather feedback from stakeholders on cloud computing services and data center connectivity. These are both strategic growth areas for Qatar as they leverage our superior broadband infrastructure and enable further digital growth.
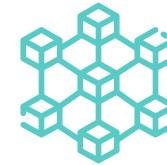
Evaluating the impact of blockchain technology

CRA initiated the process to develop a blueprint for the National Framework for Blockchain Technology, working closely with stakeholders in government, academia, and the private sector. This will detail the potential impact on government and the economy and lay out guiding principles, common working definitions, and governance structures.
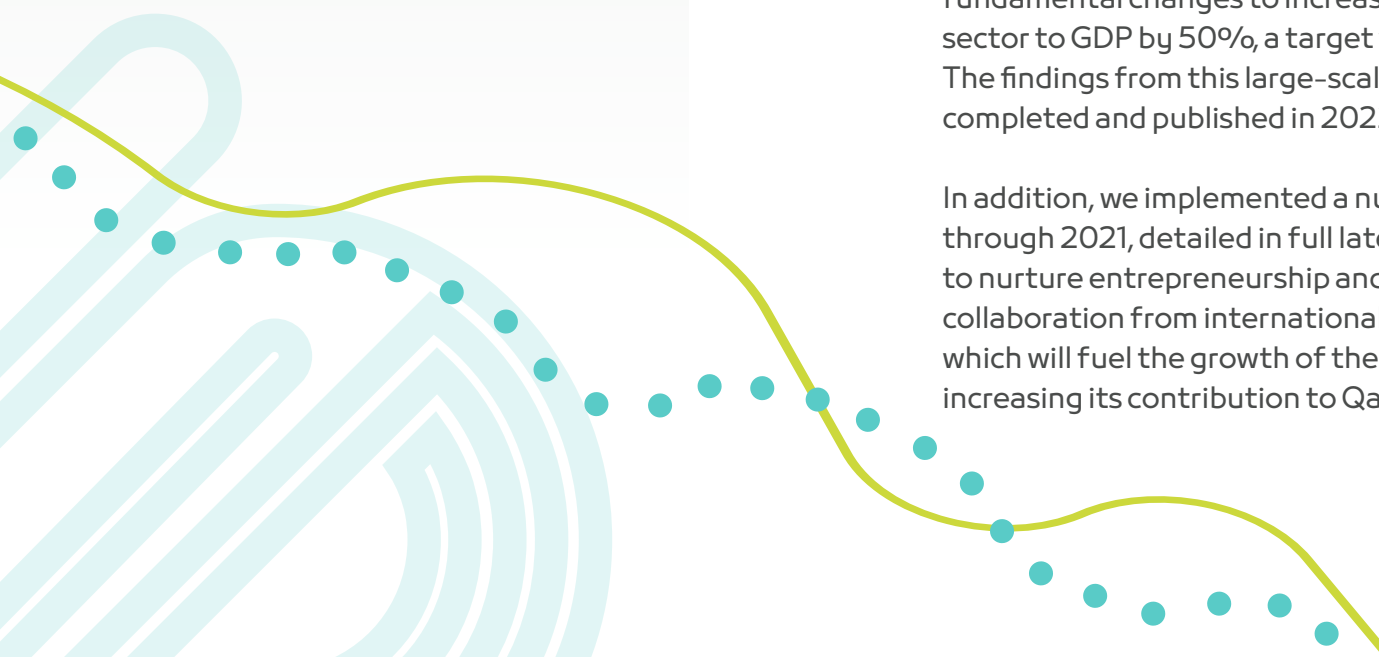
Supporting the localization of Internet traffic

CRA has played an active role in establishing the infrastructure that will enable the localization of internet traffic in Qatar. The deployment of the Qatar Internet Exchange Point (IXP) is overseen by a dedicated committee formed by the Cabinet in 2018.

The steering committee and the CRA are currently working to revamp the IXP infrastructure from a single site with no redundancy, to three different data centers, and working on expansion plans that will further attract local and international content players to Qatar.

These efforts will benefit Qatar-based organizations by reducing dependence on international bandwidth, providing significant cost savings while attracting local hosting of content and re-homing of websites.

A local IXP will amplify innovation at the research and education institutions and among broadcasters based in Qatar and will eventually support the country's emergence as a leading regional IXP and a hub for related technical activities.

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Telecom Sector

Objective : To build a more competitive and innovative telecommunications sector that supports Qatar's development objectives.

Supporting the FIFA Arab Cup™ tournament

CRA provided spectrum bandwidth and equipment licenses to facilitate the collaboration between Ericsson and Ooredoo in support of the FIFA Arab Cup™ tournament in November 2021. They provided network optimization, event management, and 5G connectivity in all stadiums, fan zones, airports, and other places of interest across 6 cities — making it the first 5G-led international event.

We additionally published a Spectrum plan for the FIFA Arab Cup 2021™ to inform stakeholders of the radio frequency plans we would follow during the event. We put in place procedures to issue and monitor radio spectrum licenses for the radio equipment and applications used during the event, and developed mechanisms to manage and monitor the radio spectrum to detect any interference or unauthorized use of radio frequencies.

Through the course of 2021 CRA :

Tested and tagged more than **6,000** items of radio equipment

Assigned more than **700** temporary radio spectrum frequencies

Issued a total of **2,100** radio equipment licenses during the FIFA Arab Cup™

Processed **200+** customs clearance approvals for radio equipment imported to Qatar

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Regulatory updates and improvements

i

CRA initiated work on developing a regulatory framework for Network Neutrality, with the necessary documentation due to be completed by December 2022. We updated the Consumer Protection Regulation including areas such as advertising regulations for telecom services and the publishing of customer complaint procedures.

ii

In February 2021 CRA completed and published the Revision of the Fees Instruction for License Fee and Industry Fee: Instruction on the Calculation and payment of the License Fee and Industry Fee (V4.0).

iii

We introduced an updated class license for short-range radiocommunications devices, to reflect the rapid changes in this technology and its applications, and to ensure full regional harmonization. We have also commenced work on the IPV6 Security Guidelines, which are expected to be completed by the end of 2022.

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Access to Digital Media

Objective: To strengthen the regulatory regime in order to support the supply and adoption of quality digital media.

✅ Progress:

CRA was an active participant in the expert sub-group for OTTs under the ITU's Expert Group on Telecommunication and ICT indicators (EGTI). The sub-group initiated its first round of work aiming to arrive at a consensus on concepts and methodology to study OTTs, develop definitions to identify indicators, and establish an approach to measuring OTTs. Based on the expert sub-group report, ITU member states decided to continue to expand the work and address it in phases on issues related to both supply and demand side aspects, technology, legal, etc.

Postal Sector

Objective : To develop a sustainable and efficient postal sector that meets the needs of customers and the national economy.

Progress :

In anticipation of the enactment of the Postal Law, CRA developed a draft postal regulatory framework consisting of key regulatory instruments and secured membership of the UPU Council of Administration for Qatar during the 27th World Postal Congress in Abidjan, Ivory Coast.

In the Universal Postal Union (UPU) report 2021, Qatar Post was ranked 3rd in the Performance Index—achieving 96.7% performance against a target of 88.0%. Express Mail achieved a performance of 99.82% and 99.53% for outgoing and incoming mail and was ranked 5th globally.
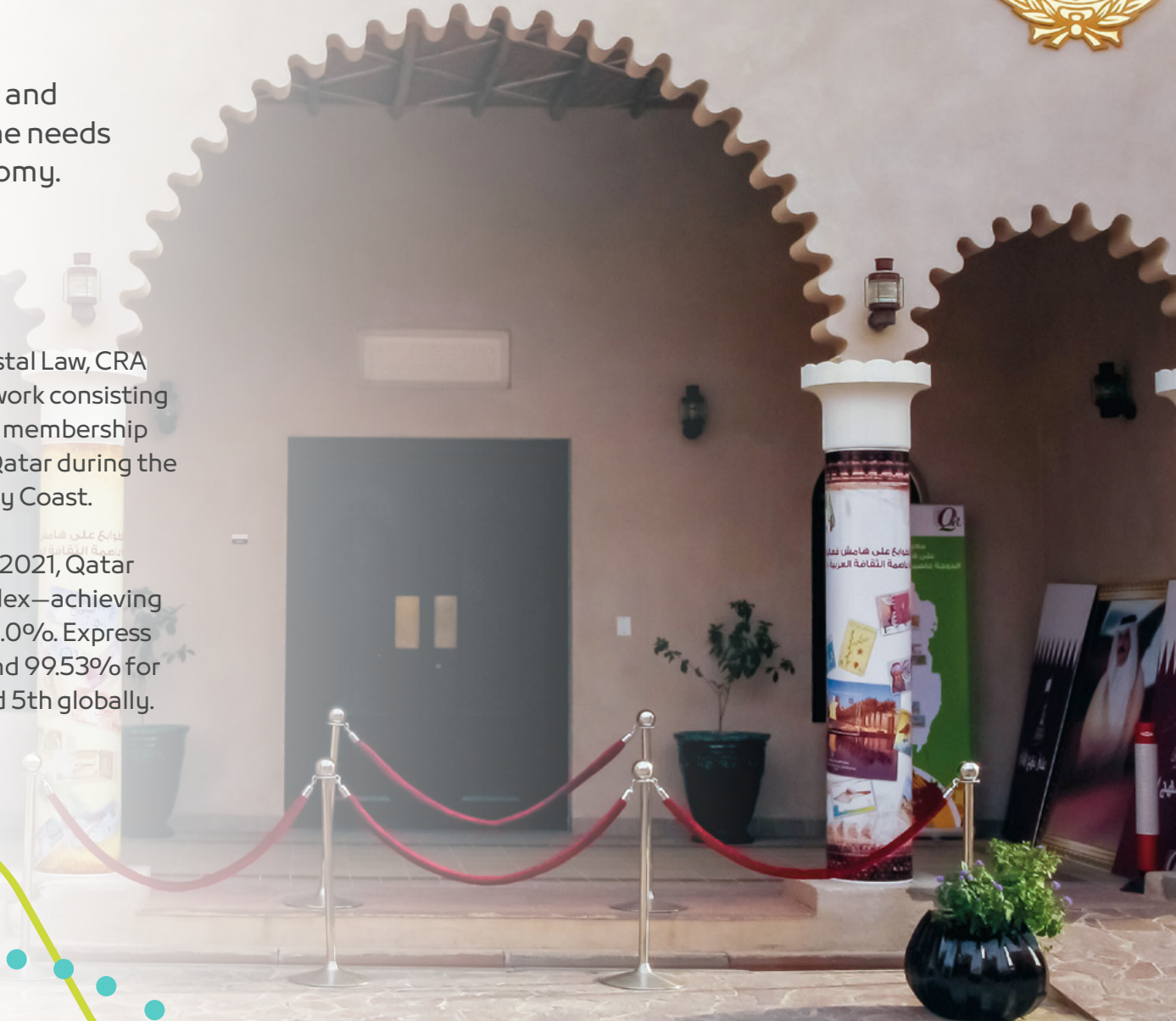
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Market
Landscape

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Market Highlights

Government focus on the ICT sector increased in 2021 with the establishment of the Ministry of IT and Communications and the National Cybersecurity Agency.

This update in the governance of the ICT sector underlines the priority of the digital agenda and sharpens the focus on it; it also raises the profile of the function and role of CRA as sector regulator and addresses a number of issues that have slowed progress in the sector over the last five years.

This in turn will support the accelerated growth of the ICT sector in Qatar—fast-tracking the Government's aim to become a leading digital economy hub through effective digital transformation initiatives.

The current agencies responsible for policy making, regulation, and market development of the ICT sector in Qatar are:

وِزَارَة الاتِّصَالَات وَتِكنُولُوجِيَا المَعلُومَات
Ministry of Communications and Information Technology

MCIT – e-government, Market development, ICT policies); DIC (entrepreneurship)

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CRA – Regulations of Telecom, IT, ADM and Postal services

الوكالة الوطنية للأمن السيبراني
National Cyber Security Agency

NCSA – Cybersecurity

mada
digital access for all
نـفـاذ رقـمـي لـلـجـمـيـع

MADA – Digital inclusion for special needs

Ministries and government agencies in Qatar have pushed forward the digital transformation agenda by leveraging technological solutions.

Inbound Investment

Inbound investment in the ICT sector has increased in 2021, both internationally and locally. Qatar Investment Authority has announced a focus on investments in the technology sector that will also help advance Qatar's economic projects, in the context of existing Qatari outbound investments in technology across the U.S., Asia, and Europe.

In October 2021, the government established the Investment and Commerce Court, a key step towards a specialized judicial system. This benefits parties that choose litigation over arbitration, and will assist local and international investors to resolve disputes faster, making Qatar a more attractive target for technology investment.

Investment in the emerging tech ecosystem

Qatar's investment in tech startups grew in 2021. Investment increased 254% from QAR 22m in 2020 to QAR 78m in 2021 according to a KPMG report. Fintech companies were the most dominant investment targets in 2021, closely followed by delivery companies. This investment continues to support the country's progress towards emerging as a fintech hub, helping to attract and empower entrepreneurs and innovators and positioning Qatar as a launchpad for their global expansion.

The country has also further progressed in establishing an effective ecosystem for fintech growth including Qatar Central Bank as a regulator, Qatar Development Bank as a developer, Qatar Financial Center as a licensee, and the Qatar Fintech Hub as an accelerator.

Fintech companies benefit from collaboration with the mature and established financial services sector present in Qatar. We expect the long-term growth of Qatar's fintech ecosystem will be driven by both the continued entry of international fintech companies and the expansion of local companies.

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Upskilling the digital workforce

Capacity and skills development are critical for Qatar to realize its ambition of digital leadership. Given the relatively small size of the country, this is an area that requires attention.

CRA is therefore focusing on helping to create opportunities for talent development which will result in a workforce with advanced digital skills that can support and drive the full potential of the digital economy.

In 2021 CRA collaborated with Huawei to conduct the 5th edition of its annual knowledge-exchange program 'Seeds for the Future.' The program was attended by 34 students from Qatar University, Hamad Bin Khalifa University, and the Community College of Qatar.

The mission to develop local talent in ICT has received a further boost with the establishment of the Doha University for Science and Technology which will greatly augment the country's capabilities in applied technologies.

Public awareness and inclusivity

We have worked extensively through 2021 to improve public awareness about our services, engage with stakeholders and inform the public of the status of new projects and initiatives, and drive utilization by educating end users on the benefits of new technologies like 5G.

We ran a "We are all Responsible" public awareness campaign on social media that featured information on our role as a regulator, simplified messaging on governing regulations and consumer rights, raising awareness on digital fraud and hacking, and information on the appropriate channels to submit telecom complaints.

We conducted a bi-lingual weekly customer survey on our social media channels to solicit feedback on QoS and customer satisfaction.

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Market Performance

The World Digital Competitiveness Ranking (IMD WDCR) from 2021 places Qatar as a leader in the ICT/Technology sub-pillars, a testament to the superior telecom infrastructure, high levels of penetration of telecom and data services, and the high level of internet usage in Qatar.

According to research published by the US Government International Trade Administration, ICT spending in Qatar is expected to grow by 9% to

QAR 33 billion by 2024

A large segment of this growth is expected to be driven by continued government investment in creating globally competitive enterprise-scale infrastructure.

Telecom Sector

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. Other licensees include companies in the passive and wholesale fixed business, public satellite, and VSAT businesses.

The table below shows current licensees in Qatar:

Individual Licensee	Services
Ooredoo Qatar	Fixed & Mobile
Vodafone Qatar	Fixed & Mobile
Qnbn	Passive Fixed
UDC	Wholesale Fixed
Es'hailSat	Public Satellite & VSAT
RigNet	VSAT
Qsat	VSAT
Speedcast Salam	VSAT

Ooredoo Qatar increased its revenue by 6% in 2021, to

QAR 7.5 billion

and an EBITDA of QAR 3.8 billion an increase of 4% over the previous year.

Growth was driven by an increase in post-paid services, Ooredoo TV, ICT services, and increased device sales.

The company collaborated with leading technology companies to showcase Remote Video Sports Broadcasting during the FIFA Arab Cup 2021™ and launched an eSports tournament as part of its new eSports brand, Ooredoo Nation – Gamers' Land.

Vodafone Qatar grew its total revenues by 14.8% to

QAR 2.5 billion

and an EBITDA of QAR 1 billion an increase of 27.5% over the previous year.

The company has improved its market position through continuous innovation and service quality for consumers and businesses alike.

Vodafone continued to expand its Fiber Optic infrastructure, doubling the number of homes and companies it services. For the business sector, the company expanded coverage through automated services and smart solutions including Internet of Things (IoT) technologies, which assist in running smart cities— benefiting the industrial, transport, and logistical sectors.

Total revenues for the sector grew to

QAR 10.5 billion

in 2021

Fixed and Mobile services dominated— with Ooredoo contributing 71.3% and Vodafone 24.1% of total revenue.

Growth in revenue realization— at 8.2% (QAR 795 million)—was primarily in the ancillary services. This is indicative of the diversification of business models in the ICT sector.

Telecom sector revenue by licensee in Qatar for 2021 & 2020):

Service Provider	2021	2020
Ooredoo	7,476	7,072
Vodafone	2,526	2,199

Mobile 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 astonishing 96% of Qatar's population had access to 5G services by the end of 2021. At 3.9 million subscriptions, and a penetration rate of 145%, 2021 saw continued migration from voice-only to mobile broadband subscriptions.

Population coverage by mobile technology:

Mobile coverage by technology	Q4 2021
3G	100.0%
4G	99.8%
5G	95.7%

Source. Ooredoo and Vodafone Qatar

Mobile usage penetration :

Mobile usage for Q4 2021	Subscriptions	Penetration
Telephone subscriptions	3.9 million	145%
Broadband subscriptions	3.9 million	145%

Source. Ooredoo and Vodafone Qatar, CRA calculations

Over the last five years, mobile voice monthly usage, in minutes, grew at a CAGR of 7.2% while mobile data usage, in GB, grew at 12.7%.

Over the last 5 years, growth in mobile voice usage (7.2%) has been outstripped by growth in mobile data usage (12.7%), reflecting a global shift in the way mobile phones are used, with greater emphasis on messaging, video-conferencing and social apps and a decline in traditional voice calling.

Mobile usage of services per month:

Mobile Services per Subscription	Q4 2021
Mobile voice per month, (in minutes)	162.1
Mobile data per month, in GB	12.0

Source. Ooredoo and Vodafone Qatar, CRA calculations

We continue to perform regular network audits to monitor data transmission speeds. The latest audit (Q4 2020) determined the "average download throughput maximum" at 672.3 Mbps—representing a significant increase from Q4 2019 when the average maximum speed was only 255.3 Mbps. 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.

Mobile Pricing

Qatar is currently 6th 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 USD and USD PPP levels.

Relative Ranking by ITU based on Mobile prices for high usage bundles:

Mobile prices compared by ITU	2020 Q4*
ITU Affordability Index Ranking (High Consumption basket)	6
Percent of GNI	0.31%
Price in USD (monthly)	16.5 USD

(*Last Available Audit)

Despite relatively higher pricing for mobile telecom services in Qatar, customer data usage has increased suggesting a healthy appetite for connectivity.
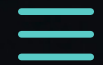
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Arab Cup – Opening Ceremony
Al Bayt Stadium, Al Khor, Qatar
30 November 2021

Spectrum Management:
FIFA Arab Cup 2021™

During the FIFA Arab Cup 2021™, CRA's primary role was to manage, assign, license, and monitor the usage of the radio spectrum and ensure high-quality uninterrupted connectivity. Our spectrum team was part of the 'Spectrum Working Group' under Host Country, to develop and facilitate policies and procedures for spectrum planning, radio equipment authorization, and testing. To achieve these objectives, CRA worked with multiple stakeholders including FIFA™, the Supreme Committee for Delivery & Legacy (SC), host broadcast service providers (HBS), media rights licensees (MRLs), telecom service providers, and infotainment providers.

Spectrum 'Test & Tag' desk offices were established at all venues to facilitate the testing and tagging of equipment of HBS, MRLs and service providers, and FIFA™ teams. The radio equipment was authorized to ensure stakeholders use and operate various radio communications and broadcasting services in the required manner without interruption from radio interference.

CRA's spectrum team participated in the Watan exercise, HCCC, and ITCC to address spectrum-related issues and radio interference during the event. CRA facilitated additional spectrum to operators, according to their requirements. In all CRA issued 2,100 equipment licenses, tested 6,000 equipment, and assigned more than 700 temporary frequencies.
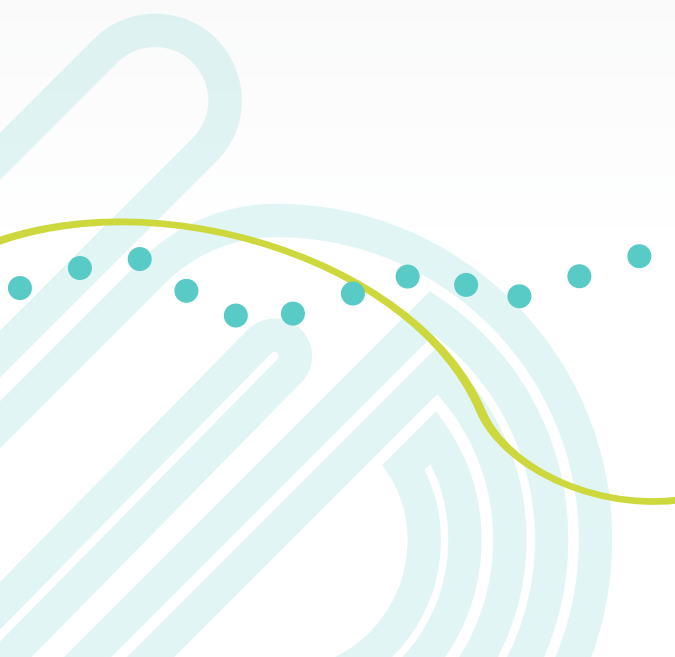
Ooredoo equipped each stadium with superfast 5G and 4G technologies; supported by 4,250 antennas to ensure coverage and reliability, backed up with satellite technology optimized for video broadcasts. They also provided backhaul for WiFi at the stadiums, carrying more than 26 Tb of Internet data with average download speeds of 258Mbps for 5G and 29Mbps for 4G, thus supporting seamless use of OTT applications at the stadiums and in the immediate vicinity.

All stadiums and FIFA™ venues were also equipped with ultra-reliable and secure private communication networks for the use of FIFA™ organizers.

Spectators in the stadiums used mobile networks to make 2.5 million voice calls, 65% of which were UHD VoLTE. 570,000 spectators used mobile Internet to download almost 80Tb of data, about 20% of which was via 5G networks.

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Hamad Port –
30% reduction in operational costs, and up to a 15% reduction in CO_2 emissions.

Case Study

5G enablement :
Hamad Port

In 2021 Hamad Port became the first 5G-enabled seaport in the Middle East. The 5G network was rolled out at Container Terminal 2 covering an area of more than 571,000 square meters.
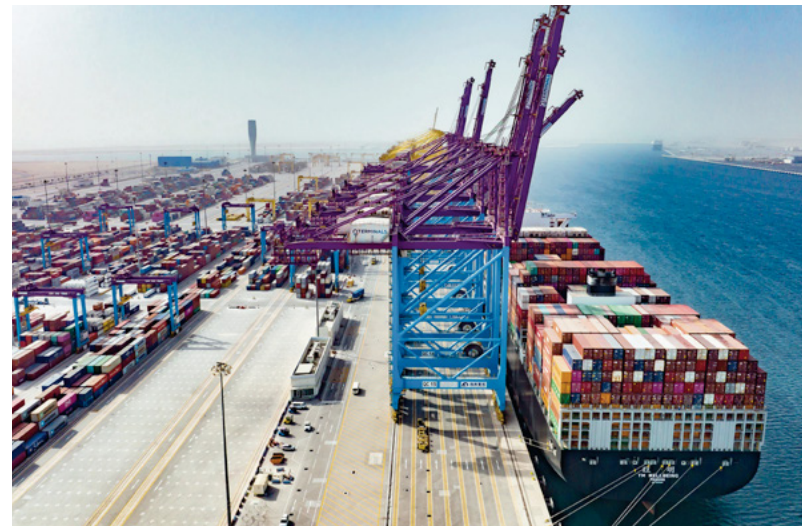
Images supplied by QTerminals

The port's operators are leveraging the 5G network to increase the benefits the terminal offers its customers including ultra-fast speed, low latency, and real-time data that can be used for remote crane and rubber-tired gantry operations, connected assets, remote inspection and maintenance, and data center connectivity.

Comprehensive 5G coverage will allow port operations to be smarter, more flexible, and more secure—and able to adapt to continuing developments, both technological and economic. Automation and analytics will allow for more efficient operations and reduce operational costs by providing actionable insights into where targeted improvements can be made.

According to Deloitte, 5G coverage in ports will result in up to a 30% reduction in operational costs, and up to a 15% reduction in CO2 emissions.

5G's high bandwidth, low latency, and the ability to support massive numbers of devices will enable new and improved opportunities to increase the ports' operational efficiency, enable new business models and reduce overall running costs. These enhancements will increase the regional competitiveness of the port and the resilience of Qatar's supply chain ecosystem.

Fixed Services

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

Key Metrics for Fixed Services:

Fixed Coverage by Technology	Q4 2021
Fiber Population Coverage	99%
Broadband Fiber Subscription	93%
Broadband Subscriptions (>30 Mbps)	92%

Source. Ooredoo and Vodafone Qatar

Subscriber based for Fixed Lines:

Fixed subscriptions	Q4 2021
Fixed Voice Subscriptions	0.5 million
Fixed Broadband Subscriptions	0.3 million

Source. Ooredoo and Vodafone Qatar

Fixed Pricing

Price comparisons for fixed services are bound by similar constraints as those for the mobile offerings. Quoted prices in Qatar tend to be for triple play packages, which include television services, thus inflating the perceived price in comparison to countries where the most common packages include only voice and data.

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.

Qatar is ranked in 57th 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.

Relative ITU Ranking for Fixed Services:

Fixed prices compared by ITU	2020
ITU Affordability Index Ranking	57
Percent of GNI	1.7%
Price in USD (monthly)	90.7 USD

Source. ITU

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Qatar has **excellent** fiber-optic coverage with almost

99%

of the population having access to **high-speed fiber**

The table below shows the percentage split for fixed broadband services by speed over the last three years. As is evident, over 90% of the fixed broadband connections in Qatar are at speeds in excess of 30 Mbps, while in 2021 already more than half (54%) of them are at 100 MBps or above.

	<10 Mbps	10-30 Mbps	30-100 Mbps	>100 Mbps
2021	1%	8%	38%	54%
2020	1%	8%	50%	41%
2019	3%	16%	52%	29%

IT Sector

Increased focus on the Information Technology sector is crucial to Qatar's aspiration to become a regional hub for digital technologies and innovation.

The sector benefits from cutting-edge technology infrastructure, and increasing recognition by the government of the need to continue to create an attractive environment for global technology majors, and to focus on digitization, innovation and upskilling initiatives over the coming years.

The IT sector is expected to grow at a CAGR of 8% reaching QAR 5.1 billion by 2024, according to the research report "IT Market in Qatar – Forecast and Analysis Report 2020–2024". Growth will be driven by the modernization of digital infrastructure, higher technology adoption among SMEs, and the increasing availability of skilled ICT professionals.

Inbound investment from global tech leaders.

As global technology majors like Microsoft and Google increase their investments in local infrastructure for cloud services, and the government enables a facilitative regulatory regime, the sector will continue to grow at pace.

Highlights through 2021 included the establishment of a new Microsoft cloud data center in Qatar that will facilitate data residency, security, and compliance and offer enterprise-grade cloud services to local organizations, Google Cloud deepening its presence in Qatar by announcing a Center of Excellence training facility in June, and Meeza launching its fourth data center built on the Microsoft Azure cloud.

Qatar's focus on enhancing capabilities in cloud services and data centers has resulted in an infrastructure that is highly available, scalable, secure, and resilient—fostering accelerated innovation in both public and private sector organizations.

A recent study by IDC suggests that by 2024 Microsoft's cloud investments alone will generate in the region of QAR 12 billion in revenue and the adoption of cloud services will generate 24,000 jobs.
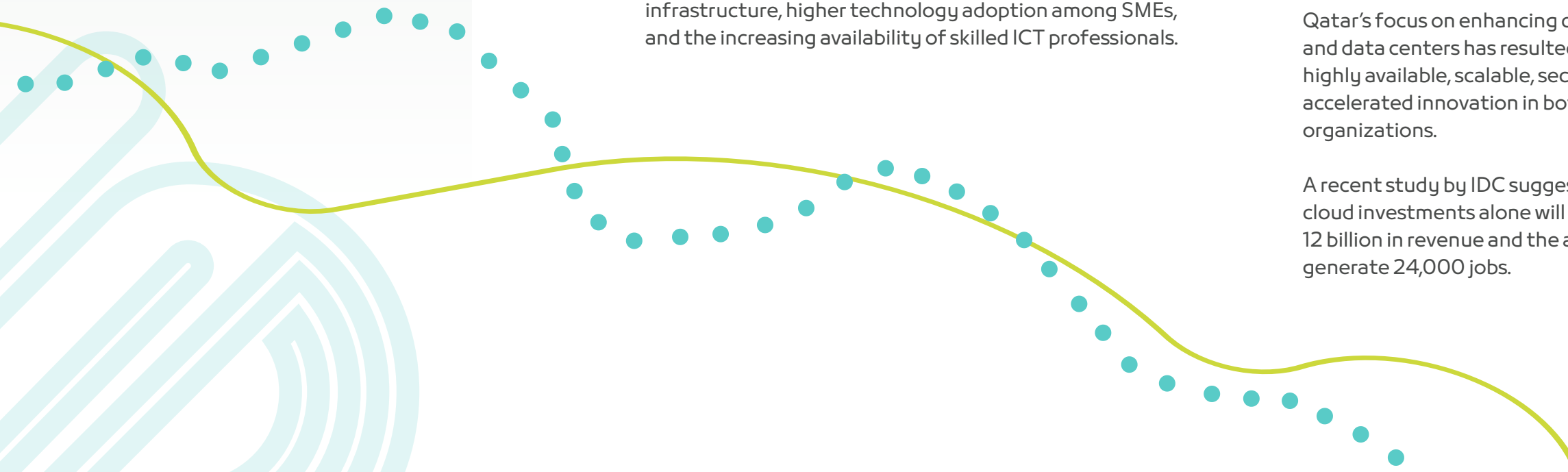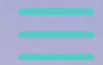
Postal Sector

Despite servicing a comparatively small market, Qatar Post was ranked 3rd out of 168 countries, on the 2021 Universal Postal Union (UPU) performance index. This ranking reflects the high reliability, extensive reach, quality, and resilience of the service overall.

Developments in future-proof postal infrastructure

Qatar Post has created an integrated infrastructure that supports automation, billing and customer service, resource management, and digital archiving. It is also investing in big data implementation to ensure future readiness, enable technology-intensive e-commerce businesses, and contribute to improved global rankings for Qatar.

In collaboration with Qatar Islamic Bank (QIB) and fintech company QPay, Qatar Post has launched a fully-integrated postal delivery Point of Sale (PoS) solution. The QPay payment solution on a new PoS device allows customers to make either cashless or contactless card payments on delivery when receiving parcels and other items through the mail. The system is completely integrated with QPost's backend tracking system.
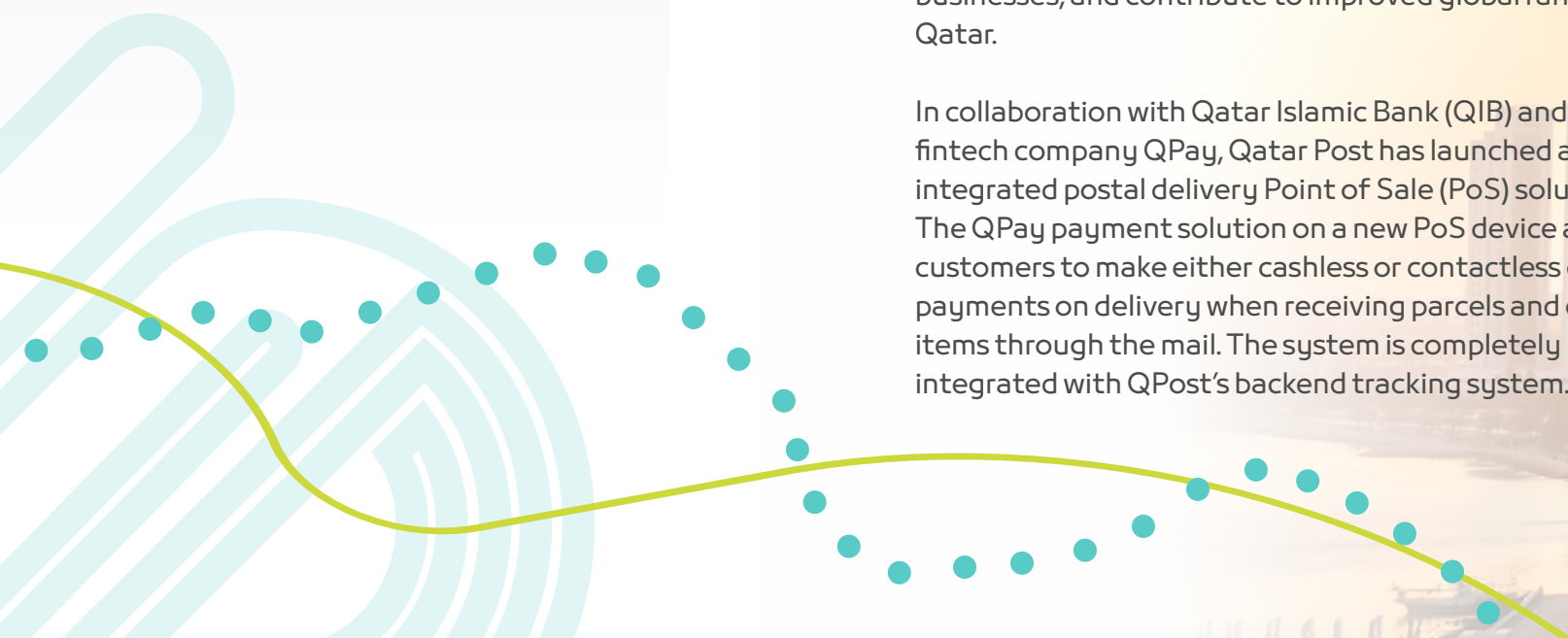
Access to Digital Media

Increased satellite communications capacity

Qatar has invested heavily in enhancing satellite capacity through Es'hailSat, offering along with other service providers, satellite-based public telecom services (Satellite TV), and VSAT services.

CRA is engaging with internal stakeholders to establish a benchmark for future needs for satellite bands based on international trends, and with external stakeholders (other regulators) to coordinate the signing of agreements for mutual inclusion of each other's territories.

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In Stadium Technology
Improved flexibility, speed, and scalability in the delivery of live sports and news productions.

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Case Study

Immersive Technology tested in FIFA Arab Cup 2021™ Stadiums

A consortium of Ooredoo, Al Jazeera, beIN SPORTS, and Microsoft, played a leading role in an International Broadcasting Convention (IBC) accelerator program in 2021 – aimed at fostering collaborative innovation between the broadcasting and technology sectors to push forward new technologies and use cases.

The program explored ways in which 5G can accelerate advances in cloud-based remote production for live sports, combined with machine learning and artificial intelligence (AI), to significantly enhance the fan experience both in the stadium and at home.

By combining Ooredoo's 5G network and Microsoft's Azure Cloud technologies, coupled with beIN SPORTS and Al Jazeera's broadcast expertise, the partners tested ways to dramatically improve the flexibility, speed, and scalability in the delivery of live sports and news production.

The trials were conducted during the FIFA Arab Cup Qatar 2021™ and at football matches hosted at Doha College to explore how new technologies can enable fans to curate their own experience of the game, from any seat or angle, and share their experiences in real-time with anyone, anywhere.

As many as 16 different camera feeds – including AI-enabled cameras, drones, and stadium spectators' mobile phones – were used to create a significantly richer choice of content accessible by broadcasters and fans alike.

Ooredoo 5G mm Wave was also trialed for the first time to address the challenges of high-speed and high-quality broadcasting.

Stakeholders Engagement

Through 2021, CRA has continued to engage actively with industry participants, consumers, government representatives, and counterparts from other nations in our efforts to continually enhance regulatory frameworks for the ICT and Postal sectors in Qatar.

Key stakeholder engagements during the year:

CRA signed an MoU for 3 years with the College of the North Atlantic in Qatar (CNA-Q) to cooperate on academic, research, and student support. The scope of the MoU includes setting up testing and validation processes & procedures for Telecom and networking systems at CNA-Q.

CRA participated in the Mobile World Congress Barcelona 2021, which is organized by the Global System for Mobile Communications Association (GSMA) and held from June 28 – July 1, 2021, under the theme: "Connected Impact".

CRA published a report on "Accessible Telecommunications International Best Practices" developed in cooperation with the MADA Center.

In collaboration with CRA, Huawei launched the 5th edition of its annual learning program "Seeds for the Future" in Qatar, which was held virtually from 23–30 August 2021

CRA issued security guidelines for IPv6 in partnership with Carnegie Mellon University.

Seeds for the Future 2021 Program

In collaboration with CRA, Huawei launched the 5th edition of its annual learning program "Seeds for the Future" in Qatar, which was held virtually from 23-30 August 2021 under the patronage of His Excellency Mohammed Ali Al-Mannai, President of CRA and with the participation of 34 students from Qatar University, Hamad Bin Khalifa University, and Community College of Qatar.

Huawei's "Seeds for the Future" program is organized in partnership with a number of academic institutions and relevant government entities, with the aim of supporting the development of local ICT talents, by educating students about the latest technologies and ICT trends and enhancing international knowledge transfer amongst them. This will ultimately encourage their role in building the digital economy and developing a stronger and more sustainable technology ecosystem in their countries.

During the eight-day program, the participating students had the opportunity to learn more about cutting-edge technologies such as Fifth Generation (5G) technology, cloud computing, Artificial Intelligence (AI), and Internet of Things (IoT) through live-stream sessions and pre-recorded courses available on Huawei's free online platform iLearningX and through hands-on workshops that were conducted in collaboration with universities and partners from the public sector. In addition, they explored Huawei's exhibition halls, campus, and stores through virtual tours.
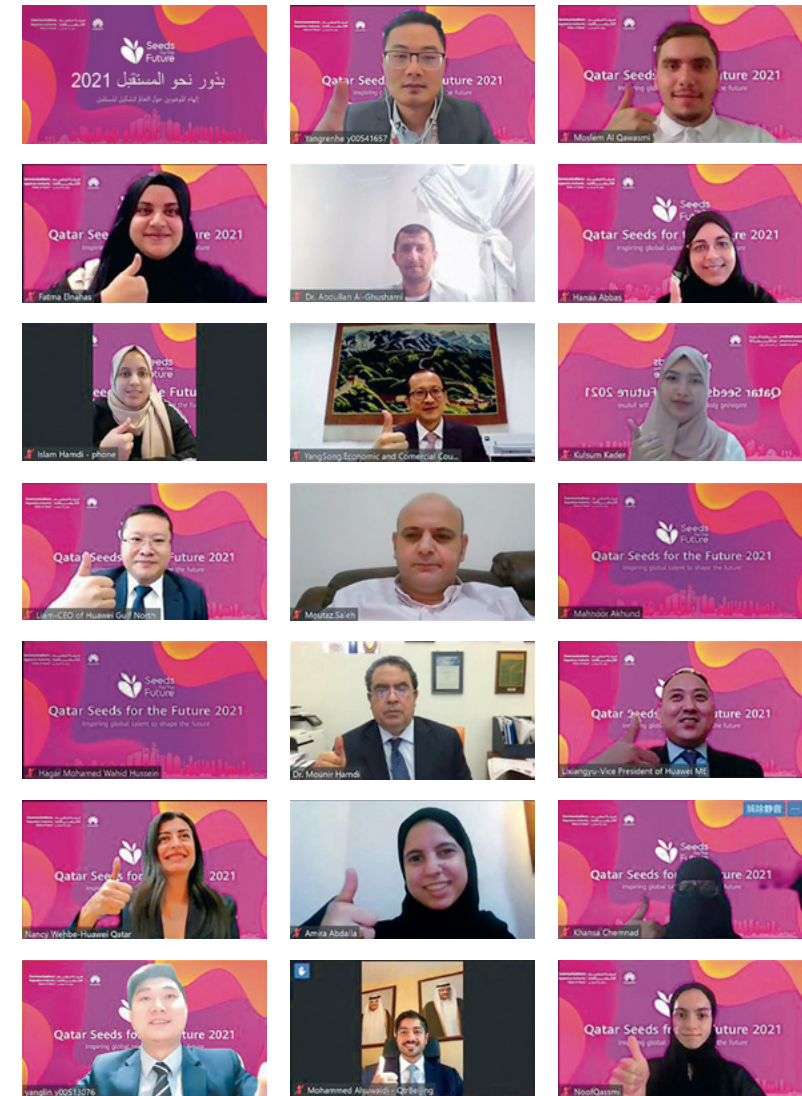
International Participation

As part of our core mandate, we send representatives from CRA to attend and participate in a variety of global events of significance to the ICT and postal sectors.

These provide invaluable platforms to engage in collaborative discussion and knowledge sharing where we can both showcase our own work and learn from novel and innovative approaches being pursued by global regulatory bodies.

12th Expert Group Meeting on telecommunication/ICT indicators (EGTI) and 9th meeting of the Expert Group on ICT Household Indicators (EGH)

25th session of Arab Telecommunications and Information Council of Ministers (ATICM).

44th round of the Arab Satellite Communication Organization's General Assembly.

Attended virtual meetings of the ICANN70 (Mexico) community forum.

18th Annual Meeting of Arab Regulators Network for Telecommunications and Information Technologies (ARAGNET).

Meetings with GCC counterparts of Telecommunications Legislation & Regulation committees.

Attended the 28th meeting of the Telecommunication Development Advisory Group.

27th Universal Postal Congress in Abidjan, Côte d'Ivoire.

Meeting (virtual) of working groups to prepare a study on reducing prices of international connections between GCC nations.

25th session of Arab Telecommunications and Information Council of Ministers (ATICM).

22nd meeting of the International Space Monitoring Movement (ISMM).

Mobile World Congress in Shanghai, China (February 2021).

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3

Performance
Review

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CRA – Performance Indicators

In line with our primary objective to regulate the ICT sector in Qatar, CRA is involved in a variety of tasks that support and further the growth of the sector.

Key regulatory functions of CRA are the registration of Qatar domains, issuing licenses for marine radio equipment and hunting radio stations, receiving consumer complaints on telecom services, issuing approvals to import radio and telecom terminals equipment into the country, and issuing custom clearance certificates for imports of certain categories of personal devices. CRA periodically measures performance on these tasks, with the results illustrated in the following figures.

1176
Domains registered in 2021

1513
Domains registered in 2020

24,945
Domains registered by end of 2021

23,769
Domains registered by end of 2020

▲ **+ 4.9%**
2020 – 2021

Total number of registered domains in Qatar increased by 4.9% over the previous year.

The top three registered domains in Qatar were:

.qa
58.69%

com.qa
29.61%

قطر.
2.46%

Mobile numbers allocated in 2021

9,700,000 Mobile numbers allocated till 2021

29,584 Mobile numbers ported in 2021

1,369 Mobile numbers returned under portability in 2021

20,000
Fixed numbers allocated in **2021**

1,544,000
Cumulative fixed numbers allocated till **2021**

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Performance Review

544
Approvals for construction of new mobile sites (2021)

60
Rejected requests for construction of new mobile sites (2021)

207
Approvals for construction of new mobile sites (2020)

2467
Complaints and inquiries received

96%
Resolved complaints

1469
Applications handled by CRA on Q-DRS (2021)

556
No objection requests CRA handled on Q Pro system (2021)

944
Tickets handled by Call Center (2021)

493
Total numver of valid complaints by service provider: Ooredoo

97%
Percentage of valid complaints by service provider: Ooredoo

1515
Tickets handled by Call Center (2020)

592
Total number of tickets handled by Tech Center (2021)

1265
Total number of tickets handled by Tech Center (2020)

275
Total number of valid complaints by Service Provider: Vodafone

95%
Percentage of valid complaints by Service Provider: Vodafone

TOP 3 in 2021 Nature of complaints for **Mobile services**

Billing, Service Disconnection, Service Intermittent & Quality Issues

TOP 3 in 2021 Nature of complaints for **Fixed services**

Charges & Billing Issues, Service Disconnections

69%
Percentage of valid complaints by line type: Fixed

31%
Percentage of valid complaints by line type: Mobile

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Regulatory Compliance

Maintaining a level playing field among service providers is a key part of the CRA remit. A key regulatory objective is the establishment and implementation of an effective compliance monitoring framework and enforcement mechanism for licensees. In June 2021, CRA shared a new compliance framework with stakeholders, via the publication of Compliance Policy & Governance Model, on its website, to support the creation of a transparent ICT ecosystem based on service provider accountability.

The document is comprehensive in its coverage, touching upon CRA's compliance governance model and monitoring policies, laying out the compliance processes for monitoring compliance by the service providers and other stakeholders, and managing cases of non-compliance.

Governance Model

The compliance governance model, shown below, is at the heart of the CRA compliance framework, detailing the parties involved and their responsibilities.

President
Sign-off compliance regulatory instruments & enforcement actions

Compliance Committee
Discuss non-compliance cases; Recommend appropriate actions

All Departments / Units
Implement Compliance Framework; Report non-compliance cases to the Compliance Committee

RAC (Licensing & Compliance)
Develop and update Compliance Framework; Oversee its implementation

All departments and units of the CRA play a direct and key role in compliance monitoring and managing non-compliance cases within the scope of their respective remit and responsibilities. The main role of the established CRA compliance committee is to:

1 **Ensure fair and consistent treatment of non-compliance cases across departments.**

2 **Review Non-Compliance Reports submitted by CRA departments and units and decide on appropriate actions.**

3 **Provide expert advice and guidance in major non-compliance cases.**

4 **Review and provide feedback on the departmental Annual Compliance Reports.**

5 **Make recommendations to the President of the CRA on final decisions and further action in non-compliance cases.**

CRA maintains an up-to-date compliance log to record non-compliance cases, key events related to the non-compliance, as well as progress made and action taken to handle cases.
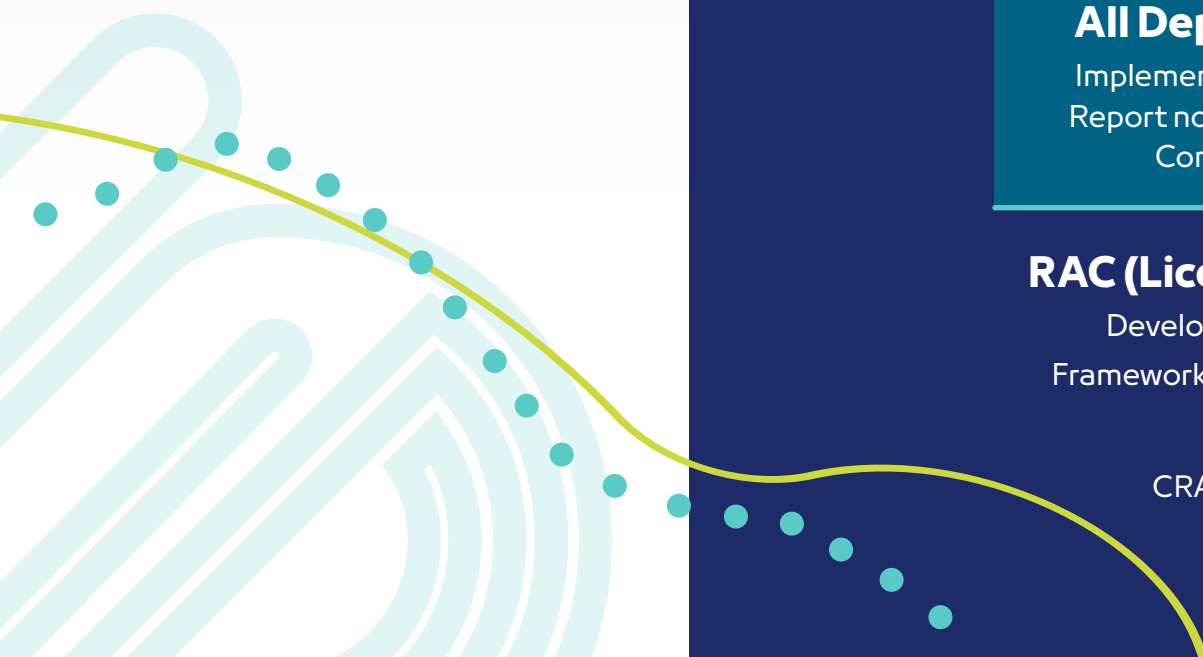
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Key enforcement measures in 2021

In 2021, the President of CRA issued eleven decisions to the service provider and the industry at large.

Most decisions related to a prior approval of promotions and tariffs, with an intent to ensure a level playing field. Others related to ensuring compliance of service provider's audited financials with the regulatory accounting systems and establishing the protocol for the calculation and payment of license and industry fees.

Key enforcement measures in 2021
(Decisions of the President of the CRA)

Date	Order Issued to	Nature
August 2, 2021	Ooredoo Q.P.S.C.	Elimination of Illegal Discounts
July 27, 2021	Ooredoo Q.P.S.C.	Approval of Shahid VIP Promotion for Consumer Fiber Broadband Services
July 27, 2021	Ooredoo Q.P.S.C.	Approval of free Apple TV STB for customers upgrading their plan
July 7, 2021	Ooredoo Q.P.S.C.	Acceptance of the Final Audited Submission of the Regulatory Accounting System for the Financial Year 2019. CRA shared multiple feedbacks on initial filings and ensured SP's compliance with the acceptable RAS.
June 21, 2021	Industry	Set the rules, procedures, and timelines for calculation and payment of Annual License Fee and Industry Fees.
May 6, 2021	Ooredoo Q.P.S.C.	Approval of the Ooredoo ONE Orbi and Installation Promotion
April 19, 2021	Ooredoo Q.P.S.C.	Approval of the Business Fiber Promotion
March 7, 2021	Ooredoo Q.P.S.C.	Approval of Business Fiber Broadband Upgrade Promotion
March 4, 2021	Ooredoo Q.P.S.C.	Approval of Bespoke tariff to 960 residential connections
February 6, 2021	Ooredoo Q.P.S.C.	Approval of Business Fiber Broadband Backup Service
January 21, 2021	Ooredoo Q.P.S.C.	Approval of the Ooredoo One New Year promotion for Fiber broadband services

Financial Sanctions Committee

The Telecommunications Law has measures (Chapter 16 of the Decree Law No. 34 of 2006) to deal with offenses and penalties related to the Telecommunications Law. Dispute Resolution Procedures published by CRA in 2015 provide mechanisms to handle disputes among service providers or between service providers and their stakeholders.

To ensure compliance by licensees and to safeguard customers, the Telecommunications Law also provides for CRA to establish a Financial Sanctions Committee. The Financial Sanctions Committee was established based on the Council of Ministers Decision No. (14) of 2020.

The committee is responsible for imposing financial sanctions on any licensee in the event of a violation of the provisions of the law, its executive regulation and decisions, and licenses issued in the implementation of the law.

Penalties imposed in 2021
(Decisions of the Financial Sanctions Committee)

Total: QAR 10,350,000.00

Date	Order Issued to	Penalty Amount	Nature
June 26, 2021	Ooredoo Q.P.S.C.	QAR 2,000,000	Refusal to grant access to its International Gateway Facilities at Al Khessa Cable Landing Station and Ooredoo Data Center 5.
June 26, 2021	Ooredoo Q.P.S.C.	QAR 1,500,000	Non-compliance with the obligation to file and get prior approval from CRA for tariffs for fixed telecom services. (QAR 1 Mil for lack of compliance and QAR 500k for anti-competitive practices)
April 11, 2021	Ooredoo Q.P.S.C.	QAR 2,000,000	Non-Compliance with the obligation to provide QNBN with access to the Qatar Data Center (QAR 1 Mil for violating access instructions and QAR 1 Mil for failure to comply with the access instructions)
March 24, 2021	Ooredoo Q.P.S.C.	QAR 600,000	Refusal to provide information on the provision of Dark Fiber services to government offices in Qatar (QAR 100k for violation of instructions for non-competitive practices and QAR 500k penalty for providing false or misleading information to CRA.)
March 11, 2021	Ooredoo Q.P.S.C.	QAR 1,500,000	QAR 1 Mil as a penalty for violations of instructions for customer protections and QAR 500k as a penalty for violation of instructions pertaining to anti-competitive practices
February 24, 2021	Ooredoo Q.P.S.C.	QAR 750,000	Failure to comply with transparency in tariff plans (QAR 500k as a penalty for violations of instructions for customer protections and QAR 250k as a penalty for violation of instructions pertaining to anti-competitive practices
February 10, 2021	Ooredoo Q.P.S.C.	QAR 2,000,000	Non-compliance with the request to provide reference proposals (to access wholesale broadband delivery services) to CRA (QAR 1 Mil for violating access instructions and QAR 1 Mil for violating instructions for interconnection between operators)

Notable achievements

Review of the Points of Presence (PoPs) market in Qatar

We have carried out a review of the Points of Presence (PoPs) of international service providers in Qatar, in order to identify the most viable regulatory option for this market segment. This included the preparation of a benchmarking report against 17 other countries on the regulatory regime and a report on the regulatory options for PoPs in Qatar which will be the base for further work in 2022 for the development of the PoPs regulatory framework.

## Review of cost justifications as part of tariff approval

According to the Decision of the President of the Communications Regulatory Authority No. 3 of 2018 Issuing the Retail Tariff Instruction (RTI) the dominant service provider must submit a retail tariff for approval by the CRA. The submission includes a cost justification demonstrating the absence of anti-competitive conduct, such as pricing below cost or excessive pricing. CRA continues to review cost justifications on an ongoing basis as part of the tariff approval process.

Approval for wholesale charges for telecom network service and products

In 2021 the CRA issued an Order directing Ooredoo Qatar and Vodafone Qatar to implement wholesale charges for access and interconnection services (termination, interconnection links, transmission links, and duct products) for the years 2021, 2022 and 2023.

CRA held two rounds of public consultation with the industry before establishing the final wholesale charges. The approved prices for wholesale services are in line with international regulatory best practices and are designed to ensure the provision of advanced and reliable telecom services across Qatar and to build a competitive and innovative telecom sector in Qatar that attracts investment.

For fixed termination, prices will remain stable for 2021, 2022 and 2023 while mobile termination prices will decrease by 11%, 12% and 13% respectively during the same period. Telecom service providers started implementing these wholesale charges from June 1, 2021, as per the order.

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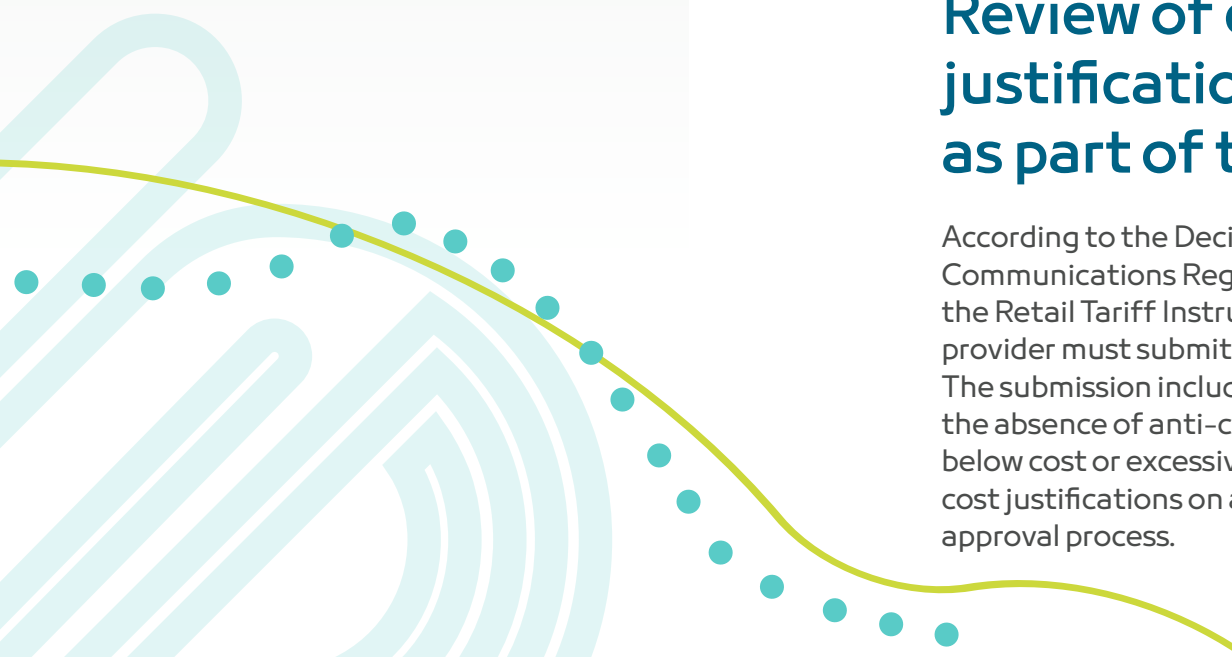
Regulatory Accounting System review

As per the Decision of the President of the Communications Regulatory Authority No. (4) of 2018 Issuing the Regulatory Accounting System Order 2019, Ooredoo Qatar as the dominant service provider is obliged to prepare a Regulatory Accounting System (RAS) consistent with the methodology and guidelines established by CRA and submit an audited version of the RAS to the CRA for approval.

In 2021 we reviewed the RAS submission for the financial year 2019, and over multiple iterations instructed Ooredoo to implement the required changes before approving the final submission.

Tariff approval and review

CRA, under the provisions of the Telecom Law, applies tariff control to Service Providers. Specifically, under the market dominance designation, CRA approves the tariff for fixed telecommunications services of the Dominant Service Provider. As per the Decision of the President of the CRA No. 3 of 2018, Issuing the Retail Tariff Instruction (RTI), the dominant service provider must submit retail tariffs for approval by the CRA. The mobile market, being designated as a competitive market, is not subject to any Tariff approvals by the CRA.

Fostering a sustainable competition in Qatar's telecom market is integral to CRA's mandate. Accordingly, we implemented the RTI, which requires the review of retail tariffs filed by service providers to verify their compliance with the regulatory framework. The benefits of RTI include greater transparency and clearer terms and conditions for customers. In 2021, CRA reviewed over 120 retail tariffs submitted by the service providers.

In a number of telecommunications markets in Qatar where Ooredoo has a very high share of the market, such as consumer broadband services and business leased lines, we are required to approve Ooredoo's retail tariffs before they are introduced into the market. This ensures not only that the terms and conditions of the tariff comply with the regulatory framework but also that the tariff can be replicated by Ooredoo's competitors. In 2021 we approved 24 Ooredoo tariffs in markets where they have a high market share. The Decisions and Order approving these tariffs are published on the CRA's website.

Customer rights protection related to Netflix on top of Ooredoo subscriptions

Following customer complaints regarding incorrect invoicing and unauthorized transactions related to the Netflix platform subscription, we issued a Decision and Order directing Ooredoo to provide a refund to all affected customers prior to June 20, 2021. This reflects our intent to regulate the sector effectively by balancing the rights of the consumers as well as those of the service providers.

Financial Performance Snapshot

CRA is also responsible for the collection and transfer of license fees and other fees stated in Telecommunications Law number 34 of 2006, and the levying of fines and penalties for non-compliance. In 2021, CRA collected revenues relating to license and industry fees, spectrum, numbering, domain registration, and financial penalties. The total amount was transferred to the government accounts during the financial year.

CRA revenues increased by 20.5% from 2020 to 2021

Source of Revenues	(2021)
License & Industry Fees	85.1%
Spectrum	11.0%
Numbering	2.8%
Financial Penalties	0.8%
Domain Related	0.2%
Total	**100%**

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4

Developing
Innovative
Regulation

Supporting digital transformation

As an ICT and postal regulator, it is a priority for CRA to further create relevant policies and regulatory framework that consider the evolving supply and demand driven by emerging technologies and safeguard consumer rights while supporting a business-friendly ecosystem in Qatar.

CRA's regulatory focus is forward-looking and aims to support Qatar's digital economy by targeting IT sector growth of 50% by 2024. Leveraging the existing infrastructure built over the past decade, moving forward, the IT sector will be a critical enabler of Qatar's ambition to transform itself into a leading digital hub.

Sustaining viable infrastructure and connectivity

Our key objectives for 2021 included reviewing the current frameworks for infrastructure development and sharing, and increasing coverage and usage of Qatar's 5G networks.

Monitoring, updating, and developing regulations.

CRA made modifications to the regulations for telecom license fees and revised reporting obligations under Market Definition & Dominance Designation (MDDD) for effective regulation of anti-competitive conduct by service providers.

Through 2021 we continued to monitor compliance with license terms and general regulatory frameworks. We handled a total of 20 non-compliance cases primarily related to tariffs (failure to file, notify or publish tariffs) and misleading promotion. Of these 80% have been resolved completely.

CRA initiated work on updating the regulatory framework for the telecom sector and we have developed a work plan which runs until 2024. This comprises the necessary tasks across all core regulatory functions related to the update of key regulatory instruments and developing new instruments where relevant. We will track progress against the work plan and produce the first internal status report in 2022.

Updated frameworks for infrastructure development

Keeping regulatory frameworks relevant to constantly changing communication technologies has been a challenge for all regulators across the globe, with their focus now particularly shifting to the areas of 5G deployment, data governance, IoT, AI, and cloud services. We recognize this and in response, have dedicated significant priority and effort to reviewing and updating the relevant regulatory framework to accommodate current technological trends.

In 2021, CRA prepared a draft for an individual license to Gulf Bridge International (GBI). When issued, it will enable GBI to build and operate a submarine cable landing station in the Free Zones. This will directly improve redundancy and the quality of support infrastructure in Qatar.

During the Covid 19 pandemic, in order to respond to the increased demand for network traffic, we extended the additional spectrum granted to service providers within bands 900, 1800, and 2100 MHz until 2023. We also issued class licenses for WiFi6 and Wireless Home Area networks and issued security guidelines for IPv6 as part of the implementation of the National IPv6 Transition Project.

In terms of support for 5G uptake, CRA intends to release additional spectrum for IMT2020 technology to improve the user experience in a fast-evolving ecosystem. The release of additional spectrum is planned as follows:

- Release 2 (Optional Assignment) Additional (1) x 100 MHz blocks in the 3.5 GHz band and/or (2) x 400 MHz blocks in the 26 GHz band

- Release 3 (Optional Assignment) (1) x 10 MHz blocks in the 700 MHz band.

The spectrum release is subject to compliance with the Applicable Regulatory Framework.

In addition, we approved regulations for infrastructure sharing (5G, access poles, and Kahramaa substations) and wholesale charges for interconnection between telecom networks.

These regulatory initiatives aim to support the introduction of higher capacity throughput via submarine cable, the creation of more secure networks following IPv6 security guidelines, and the provision of future-ready infrastructure utilizing WiFi6 and IPv6. They will facilitate the proliferation of IoT and M2M solutions, attract local and external investments and contribute to the overall growth of the ICT sector in Qatar.

Continued success in 5G deployment

The successful deployment of robust 5G infrastructure is a key enabler of Qatar's adoption of smart solutions across verticals, economic diversification plans, and emergence as a regional digital hub.

As an early deployer of 5G technology, Qatar has achieved 5G coverage of 95.7% as of 2021. Global network intelligence company Ookla ranked Qatar 5th in the world for 5G availability and Doha 6th in the world for median 5G speeds (382.5 Mbps) in Q3 2021.

In response to growing demand for high-speed bandwidth, we plan to release additional spectrum (up to 1000 MHz) to service providers for 5G networks. To ensure a high quality of service, we also conduct periodic audits to benchmark service provider performance for obligated technologies (3G, 4G, and 5G).

Learning from the Arab Cup, planning for the World Cup

FIFA World Cup Qatar 2022™ is a unique opportunity to showcase Qatar's advanced technology infrastructure in the fans zones and the newly built stadiums.

Ooredoo is collaborating with Ericsson to roll out solutions that optimize 5G connectivity in the eight stadiums to improve the streaming experience for end-users during the tournament.

These technologies were successfully tested when Qatar hosted the FIFA Arab Cup 2021™. For instance, Ooredoo installed 4,250 antennae across six stadiums for superior coverage and reliability. According to the FIFA™ website, 80TB of data was downloaded during 32 games, 20% on 5G networks with an average download speed of 258 Mbps; while 2.5 million voice calls were made, 65% of which were on UHD VoLTE.

During the Arab Cup, FIFA™ observed 326 million impressions on social media, 6.5 million engagements, and 57 million video views.

Novel solutions were tried such as Sponix Tech's SPov Technology which allowed viewers to view in-game events from an individual player's point of view. Vodafone established a new Network Operations Center in Lusail, to support these technologically demanding initiatives.

Qatar is now poised to build on the momentum created by infrastructure developed and deployed in the last few years. While the immediate-term focus remains on hosting FIFA World Cup Qatar 2022™, the legacy of this infrastructure will be the creation of a digitally empowered society, and a vigorous startup ecosystem that will drive the realization of Qatar's ambition to achieve regional leadership as a digital hub.

Protecting the right of access to telecommunications

We remain fully committed to prioritizing the protection of consumers. In 2021, we issued a public consultation for the policy on Communications Consumer Protection which sought to further clarify consumer rights and obligations towards service providers.

We strongly believe that equality of access to telecom infrastructure and services is important for any inclusive society. In collaboration with the Moda Center, we published a best practice report on accessible telecommunications. The intent of this report is to raise awareness, educate stakeholders on the availability of solutions that allow users with impairments to access telecom services, and establish global best practices. The report also provides recommendations for action on improving inclusive access to telecom.

Consumer Protection

CRA worked on preparing the Communications Consumer Protection regulation, clarifying the rights and obligations of consumers towards their service providers, including the right to be connected; information transparency; the protection of customer information or data; and the use of advertising, marketing, and branding, including direct marketing.

Regulatory framework enhancement

In 2021 we led the regulatory assessment and development of a key policy document—collaborating with various stakeholders to prepare a policy for Cloud and Data Services. This formed part of our preparatory work for the National Blueprint for Blockchain. in addition we reviewed the regulatory framework for earth stations in motion (ESIMs).

We also supported QFZA to draft the Internet Intermediary Liability Regime Regulations, which will protect technology intermediaries in free zones on issues related to cloud computing, including data hosting, data transmission, and data monitoring. This will facilitate future cloud computing infrastructure development, attract foreign and local investments in data centers and cloud services; facilitate the migration of business processes to secure cloud services, eliminate CAPEX needs; and accelerate digitalization and the expanded use of AI.

Al-Janoub Stadium

Inspired by the sails of traditional Dhow boats, used by pearl divers from the region.

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Case Study

In-Stadium Entertainment: Vodafone

Modern stadiums are an epicenter of communication technology and applications and digital transformation. Spectators seek immersive and connected in-stadium experiences while attending live events and performances, consuming and sharing their experiences in real-time using ultra-high-definition video streaming.
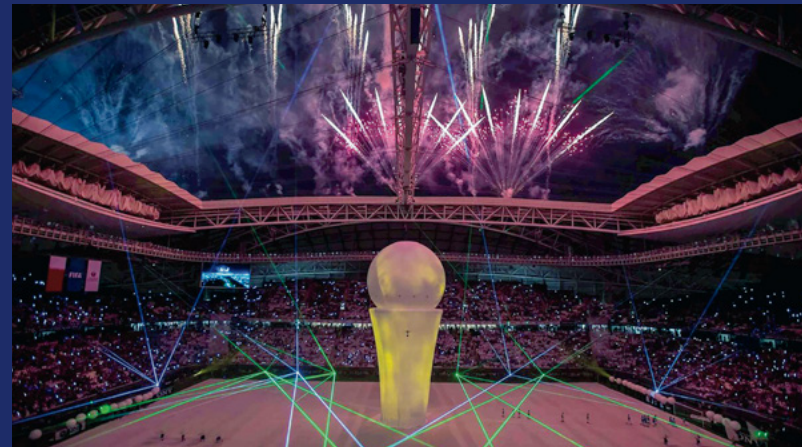
Media broadcasters require reliable networks to distribute an ever-increasing volume of data. Several sports tech companies offer augmented reality and virtual reality applications that create lifelike immersive experiences, even while a fan is sitting in the stadium.

With Qatar hosting multiple global entertainment events it is essential to put in place technologies that support and enable such consumer experiences. Vodafone has completed trials with speeds of 8.1Gbps down/734 Mbps up speed by using 5G features delivered over the mmWave Spectrum. This will allow real-time 360° 8K video streaming of sports or entertainment events.

Vodafone's advanced GigaNet network will facilitate the consumption of innovative technologies like security robotics, hologram screens, and even automated fan bus transportation.

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Education City Stadium

The stadium is located within several university campuses at the Qatar Foundation's Education City.
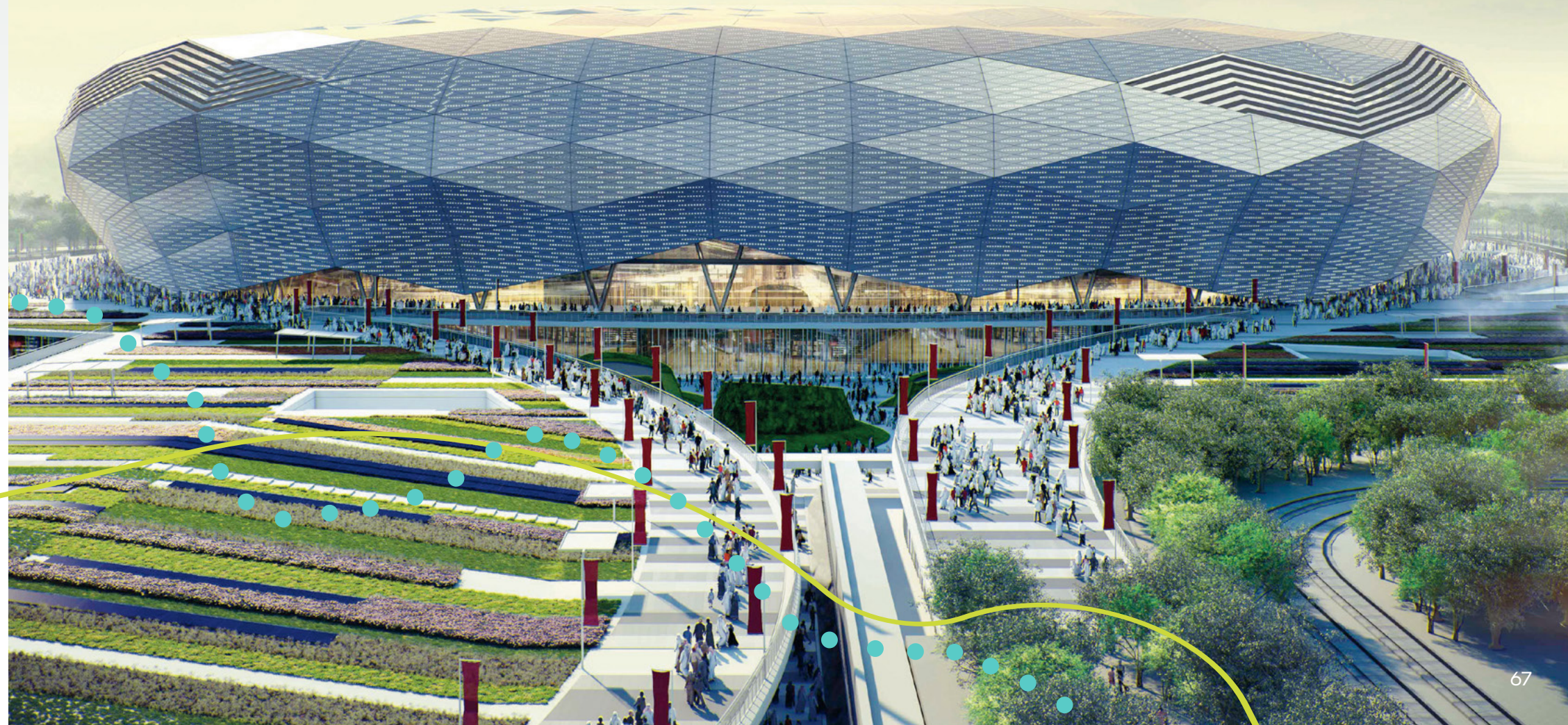
Case Study

5G Connectivity: Ericsson

Ericsson is partnering with service provider Ooredoo to provide infrastructure for 5G connectivity and network optimization and event management, across stadiums, dedicated fan zones, airports, and places of attraction in Qatar.

The Ericsson-powered RAN network will enable enhanced mobile broadband with very high network speeds, low latency, and large throughput—allowing fans to enjoy high-definition real-time interactive and streaming experiences.

To support the FIFA Arab Cup™ in 2021 and prepare for the FIFA World Cup™ next year, Ericsson and Ooredoo successfully implemented the world's first 5G indoor shareable solution, achieving data speeds of 1.5Gbps.

In order to serve the large number of FIFA World Cup™ visitors who will use different service providers, the two companies are collaborating on the Indoor Connect 8855 solution—a multi-operator, multi-vendor solution that delivers beyond-gigabit speeds within stadiums to subscribers of multiple different communications service providers.

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Supporting the digitization efforts of enterprises in Qatar

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Case Study ——————————————

Cloud Computing: MEEZA

MEEZA provides customers with access to cloud services and solutions through options of a private, public, or hybrid network. It offers a pay-per-use model that helps clients align their IT budgets with their application usage and benefits from access to applications that can be scaled elastically without incurring higher costs of ownership.

The company facilitates data protection, retrieval, and redundancy by offering a Backup as a Service (BaaS) model—providing an effective mechanism for compliance fulfilment. The managed storage solution is a powerful option to host business-critical data and improve resilience in business operations. MEEZA also offers various solutions to monitor infrastructure in real-time and provides alerts in the event of any security issue or performance failure.

MEEZA's solutions are vital to the digitization efforts of enterprises in Qatar, as they allow companies to focus on core business operations while ensuring their data is safe both in transit and at rest, and secured against cyber threats, at a fraction of the cost of dedicated infrastructure.

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Postal Service

As businesses and customers migrate to digital communication, the postal sector is in the process of adapting to the new business environment. However, decreasing demand for conventional postal services and the relatively small size of Qatar are constraints for the sector.

In anticipation of the enactment of the new Postal Law, which will establish among other things the exact role and responsibility of CRA in the postal sector, our focus has been on establishing the regulatory framework for this law and ensuring consumers remain protected. CRA has worked extensively on the preparation of the postal regulatory framework that includes key regulatory instruments which will be updated and consulted upon with stakeholders after the enactment of the Postal Law. The intent is to improve utilization and enhance international participation in the Postal sector.

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Access to Digital Media

Our strategic intent is to maintain high levels of consumer adoption and usage of digital media in Qatar.

We have initiated the process to establish a regulatory framework for Network Neutrality with an external consultancy and we expect to complete the assessment and formulate a regulatory framework by the end of 2022.

Key Metrics

Public consultations

Stakeholder consultations have been an integral part of the CRA regulatory mechanism and the updates to regulatory instruments that we have developed through 2021. The key documents for which public consultation was undertaken during the year were:

Communications Consumer Protection Policy & Regulation, which establishes the rights and obligations of Telecom service providers and the consumers of their services.

Assigning full frequency band (5925 – 7125 MHz) to Wireless Local Area Network (Wi-Fi 6) network, for which we requested feedback from both local and international stakeholders.

Customer awareness of the services provided by CRA, surveyed through a bi-lingual social media campaign. A questionnaire was published on a weekly basis across all of our social media accounts.
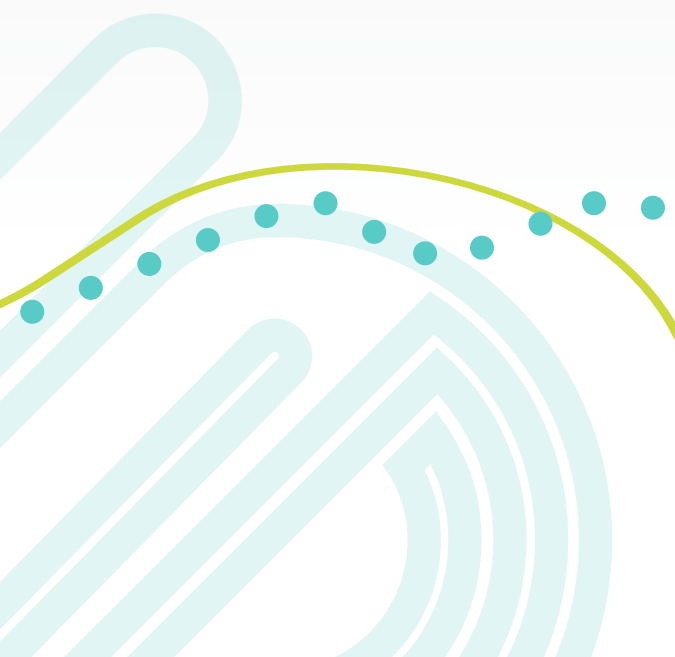
Key regulatory instruments issued

During 2021 we published three key policy documents related to the National Frequency Allocation Plan, Spectrum Management, Calculation and payment of license fees.

① National Frequency Allocation Plan

We published an updated version of the National Frequency Allocation Plan on the CRA website. The plan follows the recommendations of the World Radiocommunication Conference 2019 and aims to ensure Qatar's alignment with global trends in frequency allocation.

② Spectrum Management Outlook 2022

The Spectrum Management Outlook provides stakeholders with an approach and planned activities for spectrum management. It covers spectrum usage fees, lays out the mechanism for auditing mobile networks for QoS, and highlights strategic projects to complete prior to FIFA World Cup 2022™.

③ Instruction on the Calculation and Payment of the License Fee and Industry Fee

CRA issued an amended version of this regulatory instrument to implement the "Decision of the Minister of Transport and Communications No. (25) of 2019 setting the fees of telecommunications licenses and other relevant fees and for the provision of the related services", and also to simplify and streamline the process for the payment of these fees. The issuance of the amended version followed a consultation with the service providers on the draft revised Instruction.

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5

The
Outlook

Shaping the landscape of a digital and innovative economy

2021 marked the seventh anniversary of the CRA's establishment as an independent ICT and postal regulatory authority. Over this time, we have been consistent in setting out a comprehensive regulatory framework aligning the overarching requirements of telecom, IT, access to digital media, and postal services, coupled with strategic initiatives to support innovation, investment, and in general to accelerate the contribution of the ICT sector to the national GDP and Qatar's digital economy growth.

As the implementation of the strategic initiatives stated in the 2020-2024 CRA strategy goes ahead, Qatar's ICT sector will continue to capitalize on its world-class infrastructure.

Moving forward, the government of Qatar is setting ambitious targets to reap the benefits of established technology enablers and further develop the digital ecosystem spearheaded in the country over the last years including accelerators, incubators, innovation labs, investment funds, sandbox regulations, and coordination among cross-sector regulators, particularly in areas related to fintech, e-sports, digital health, insurance technology, e-commerce, and e-logistics.

CRA has a major role to play in realizing these developments and we are committed to building and maintaining strong capabilities alongside state-of-the-art regulatory frameworks and sector policies.

Qatar's cloud-first policy is purpose-designed to enable digital innovation and economic growth in Qatar and will be instrumental in reducing the operational cost for businesses to scale, reducing their carbon footprint, and supporting companies' efforts to comply with ESG requirements.

Looking ahead to the FIFA World Cup Qatar 2022™

In 2022, our national communications infrastructure and networks will be diligently tested and verified during the FIFA World Cup™ tournament as more than 3 million people in the country are expected to access telecom networks and millions more to watch the games via live TV broadcast or online streaming.

Telecom providers in Qatar will use the 2022 FIFA World Cup™ to showcase advancements in 5G connectivity and revolutionize the fan experience through enhanced digital services and novel technological solutions.

For example, Ooredoo Qatar and Ericsson have announced the successful implementation of the world's first 5G indoor shareable solution in Qatar, achieving speeds of 1.5 Gbps.

This solution has been commercially deployed in all stadiums across the country to enhance the immersive experiences of the tournament. The country's advanced 5G infrastructure facilitates other investments in the digital economy.

"Qatar's ICT sector will tap into the digital legacy of the FIFA World Cup Qatar 2022™ to utilize the technologies and digital solutions created for and utilized during the event to build unmatched digital capabilities in sports and gaming sectors in relation to fan experience, stadium technologies, match monitoring, viewing, streaming and broadcast technologies."

Upcoming regulatory initiatives and publications

In 2022, CRA will undertake a comprehensive national ICT research study — the first of its kind. It will focus on the supply side, but will also assess at a high level the demand in key verticals to drive growth. The study is aimed to establish the sector taxonomy and will run a large-scale primary survey for the ICT sector in Qatar — reaching out to all market players and a large circle of stakeholders from the wider ecosystem.

The research will collect strategic inputs to help roadmap the digital economy and highlight key parameters for localization of the ICT industry to meet growing needs across economic sectors.

The CRA study will deliver key insights into the effect of the in-country presence of main tech players such as Microsoft, Google Cloud, Meta, Ericsson, etc., as well as existing service providers. This knowledge will be crucial to transforming Qatar's ICT sector into a global platform for piloting and modeling new technologies that will add value to related enterprises and the national and global economy.

We will continue to implement the action plans stipulated in the consultations, policies, and studies conducted in 2021 in priority areas such as blockchain, cloud, IPV6, and so forth. These next steps will be instrumental in supporting various sectors to adopt the latest technologies and accelerate their digital transformation capabilities.

The role of regulators moving forward

The growth of Industry 4.0 particularly in the areas of smart cities, transport, logistics, and health will require regulators to provide guidelines in standardization, interoperability, and interconnectivity to streamline processes.

As Qatar is realizing its visionary goal to be a competitive and innovative digital hub in the region, national regulators should increase cross-sectoral collaboration and coordination to align with digital transformation efforts and foster innovation and scalability within Qatar's startups and SMEs.

Enhanced collaboration among national and international regulators is key to boosting the digital economy by being open to regulatory experimentation through sandboxes and pilot initiatives – and that is the essence of the fifth-generation regulation standard set by ITU. Regulation in the digital era must be contextual, modular, and multi-dimensional with a focus on policy implementation.
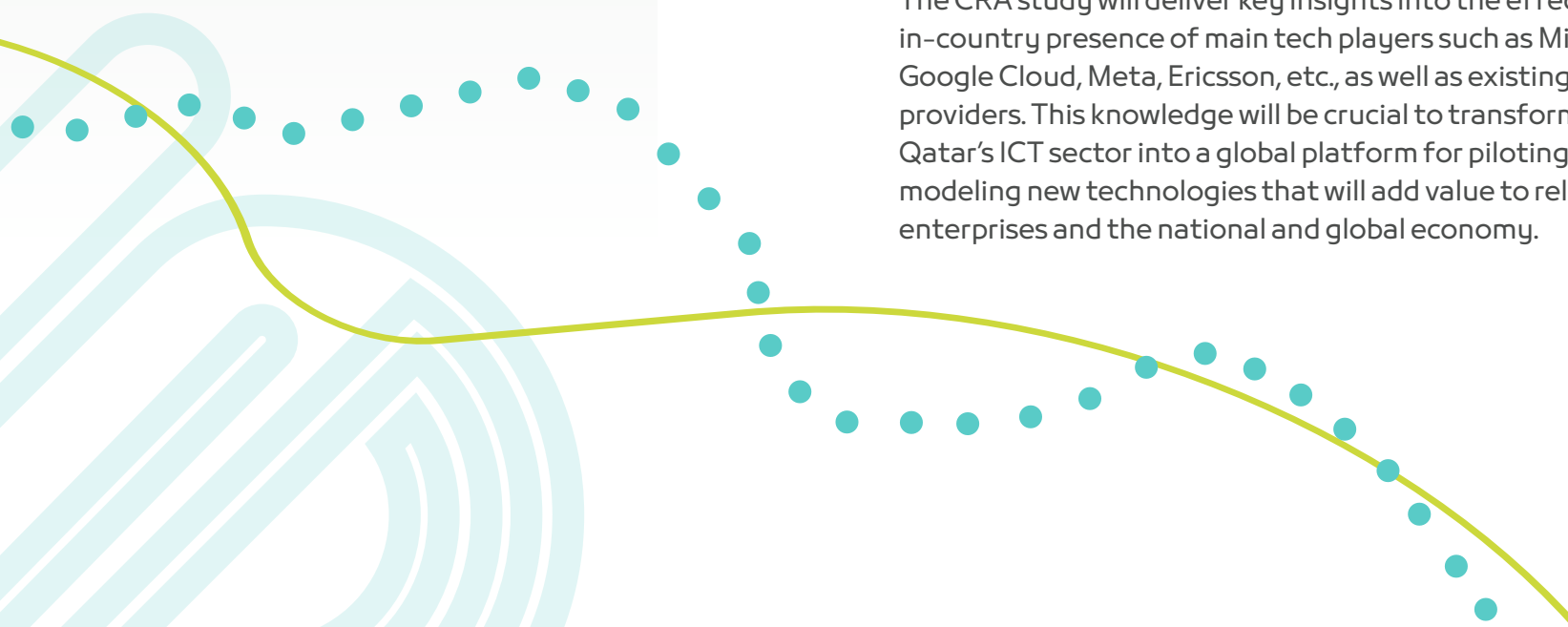
Continuing progress towards a digital economy

During 2022 CRA also plans to initiate work on developing a digital economy governance framework to pave the way for building a vibrant digital economy ecosystem. The project will comprise a comprehensive assessment of the overall digital ecosystem and the relevant roles and responsibilities of various public sector agencies. Our analysis will include an overall sectoral assessment, covering both the local tech sector and market as well as global technology trends. We will also benchmark against leading digital economies, in order to establish opportunities for growth, identify gaps and propose suitable governance models in the context of Qatar's ambitious digital agenda.

Once established, this framework will help shape the sector's requirements in terms of investment in line with the plans announced by the Qatar Investment Authority to invest in technology ventures overseas to support large-scale projects in Qatar.

The presence of free zones like Qatar Financial Center, QFZA, QSTP, and Invest Qatar as promoters of inbound FDI supports the growth of the local digital sector by increasing the number of companies, attracting talent, accelerating digital transformation, driving local research and studies, and boosting venture capital and exports.

The significant rise in local adoption of emerging technologies such as IoT, M2M, blockchain, and AI among various industries and organizations will generate volumes of data. This means that "Data Free Flow with Trust" laws and regulations to govern the data cross-border flow with the broad economic domain will be crucial—as stated in the UNCTAD Digital Economy Report 2021 on cross-border data flows and development.

The adoption of industry 4.0 will highlight the demand for talent acquisition through hiring, upskilling, and re-skilling. Qatar's new universities, computing-related programs, and digital competence excellence centers established by international technology providers in the country will increase the availability of technology resources but more studies should be conducted to understand the market needs of all sectors.

Communications Regulatory Authority of Qatar

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