

# EMERGING ICT TRENDS IN QATAR THE FUTURE IS NOW

2014





## Introduction

Societies around the globe are benefitting from the rapid development of information and communications technology (ICT). In order to identify and understand the implications of these emerging trends, the Ministry of Information and Communications Technology (the Ministry) is preparing a series of white papers that identify these ICT trends and build further awareness among policymakers and decision makers about the opportunities and challenges they offer.

As a foundation for understanding these trends, the Ministry takes an active part in the work of various global and regional ICT bodies and committees, conducts ongoing research, and consults with all sectors in Qatar on a regular basis. In addition, the Ministry has launched a series of roundtables, inviting stakeholders in Qatar who have the relevant expertise and experience on the particular topic. The roundtables serve not only to validate the findings from the Ministry's ongoing research and engagements, but also to add insights from other government agencies, private and public organizations, and academia. This paper, in particular, relies on the discussions and insights that came out of a February 2014 roundtable convened by the Ministry to identify the ICT trends that are likely to have significant impact on the society of Qatar as a whole. The Ministry is planning quarterly theme-oriented roundtables and resulting papers.

The direction provided by national strategic documents such as the *National ICT Plan 2015*, *Qatar's National Broadband Plan (QNBP)*, and *Qatar National Vision 2030 (QNV)* were important starting points for the roundtable discussion, as was an overview of the MENA region and international ICT developments. However, this paper would not have been possible without the valuable insights and real-world experiences provided by the representatives from various ministries, the health, education and business sectors, and academia who took part in the roundtable. The Ministry would like to thank all participants for generously sharing their time to discuss the ICT technologies they are adopting, the impact of such technologies on efficiency and productivity, and opportunities as well as barriers to adoption.



## Background

A series of studies surveying Qatar's ICT landscape in 2013 reveal that households, individuals, businesses, and the government sector, specifically, are more connected than ever before. International rankings confirm Qatar's own research—the World Economic Forum's Networked Readiness Index 2014, which examines the impact of information and communications technology on nations' development and international competitiveness, ranks Qatar 23rd out of 148 developed and developing countries. This ranking recognizes Qatar as the most networked society in the Arab world.

The nation's successes in modernizing and improving its government have been recognized in a host of other international benchmarking studies.<sup>1</sup> ICT plays a key role in this transformation, and in 2013 the Ministry released the QNBP, which reflects the government's commitment to accelerating the development of a knowledge-based economy by providing high-speed, high-quality, affordable broadband to the people of Qatar, as well as to providing guidance to the market on policy actions needed to maximize the opportunities offered by broadband technology. The development of digital networks and smart cities, and many other technological milestones, are included in the plan. The QNBP includes several priority policy action items, including telecom liberalization and the promotion of e-government services, e-learning opportunities, e-health initiatives, and small and medium-sized technology-based enterprises (SMEs).

The decision to award Qatar the 2022 FIFA World Cup has fueled a wave of investment in ICT in Qatar. A number of new IT tenders in areas such as e-government and healthcare as well as a series of new IT projects at large organizations such as Sidra Medical and Research Center and Qatar National Bank, are other examples of how ICT is supporting the social and economic development of Qatar.

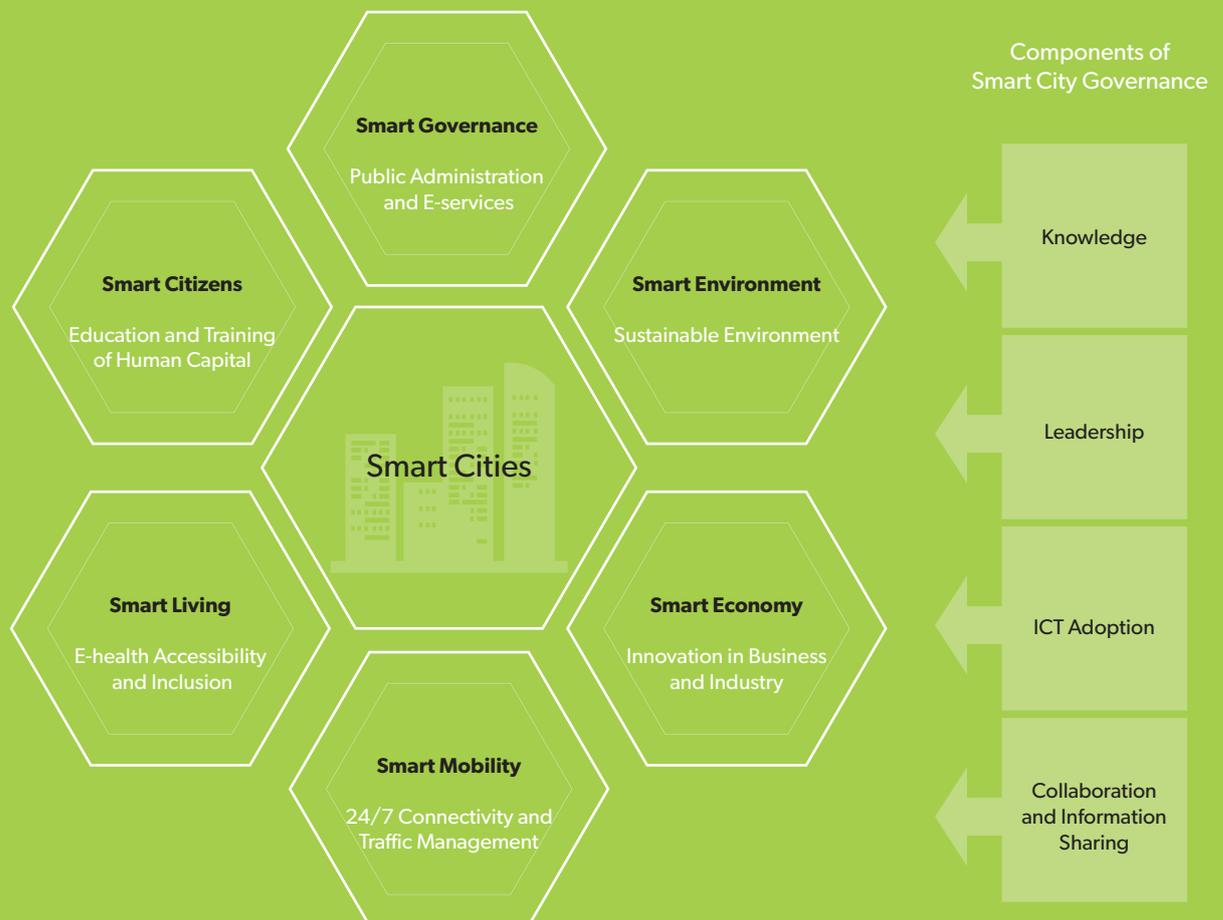
<sup>1</sup> *United Nations E-Government Survey 2012.*

# Emerging ICT Trends in Qatar

## Smart Cities

The rapid development of emerging technologies and innovation processes is increasingly reshaping our urban environment. New-generation services and infrastructure combined with smart governance are resulting in a new “smart city” model. ICT is increasingly being used to boost the business economy and the environment and improve the quality of life in Qatar’s cities. The chart below suggests how ICT can be used to establish smart cities.

Figure 1: ICT FOR SMART CITIES AND SMART SECTORS



**Enhanced ICT in a smart city  
enables advances in all sectors.**

According to a recent report by Gartner,<sup>2</sup> Qatar has the highest GDP but also the highest CO<sub>2</sub> emissions per capita in the world. A scarce and expensive energy supply is an important driver of innovation and efficiency improvements in many countries. This driver is less prevalent in Qatar. The Gartner report states that Qatar has to develop a policy that creates awareness of the need for a sustainable footprint and the challenges it will create for citizens and cities. This shift in mentality will require changing social attitudes, commitment to long-term thinking, and a different decision-making process. To this end, the Ministry of Information and Communications Technology will publish a sustainable smart cities strategy during the 2014–2015 fiscal year.

Participants at the Ministry's ICT Trends roundtable were aware of the smart city concept in general, and interested in adoption and use of ICT to improve their respective sectors. However, they suggested that more information, awareness, and government support are needed for organizations to better understand the benefits and full potential of the smart city concept before these organizations make major investments in ICT. Participants argued that organizations in Qatar tend to prefer traditional ways of working and are slow to realize the full potential of ICT to improve efficiency and innovation in their sectors. Change management is needed to reduce organizational resistance.<sup>3</sup>

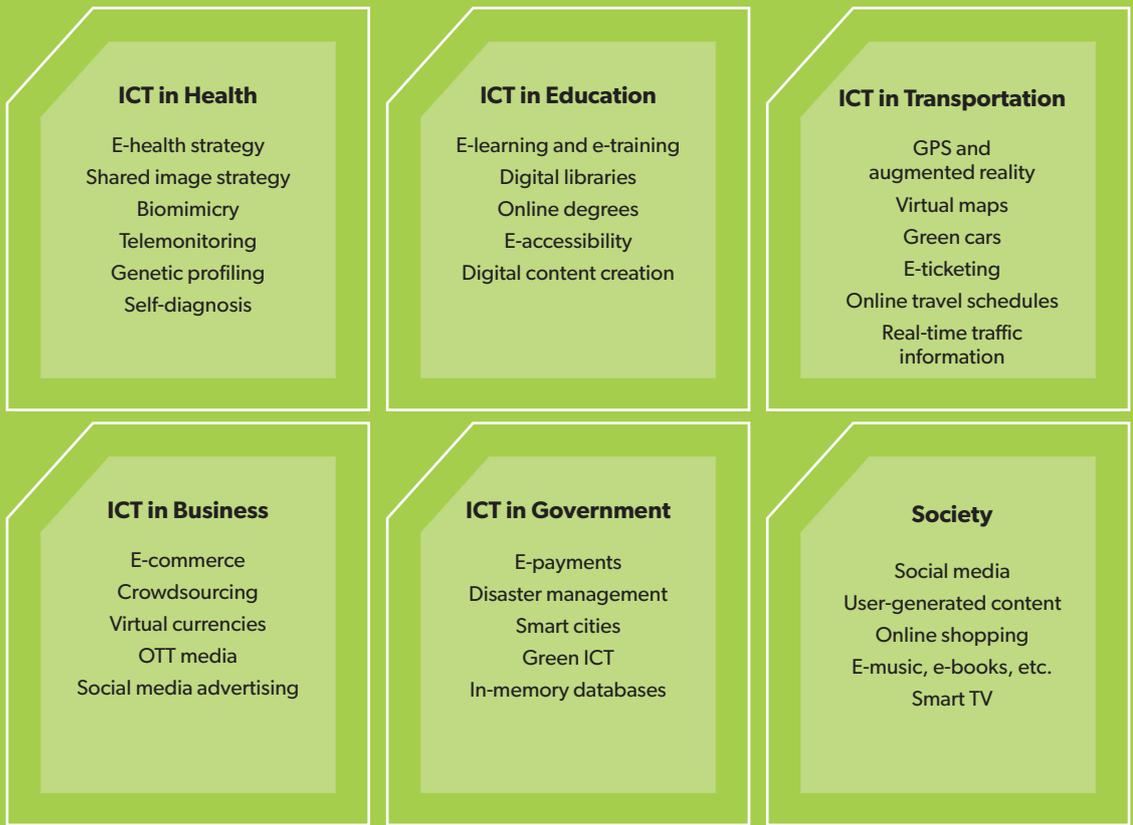
Interoperability is another success factor for complex ecosystems like smart cities. Well-established, open, and innovative ecosystems are the basis for all global applications. The Ministry strives to increase awareness and facilitate implementation of the benefits of ICT in all sectors through coordinated efforts such as the formation of cross-sector work groups for the implementation of Qatar's National Broadband Plan. Collaboration and integration between government agencies is seen as key to improving services, exchanging information, and reducing costs and the use of resources.

Enhanced ICT in a smart city enables advances in all sectors. Improving traffic conditions, for example, improves services that depend on them, such as ambulances, whose better mobility and response times are both societal and economic gains. To start the transformation to a smart city, participants suggested that initial focus should be on data-heavy sectors, specifically health and education, with an eventual shift to include other sectors as well. Figure 2 provides a snapshot of how ICT can be used in various sectors in Qatar.

<sup>2</sup>Gartner, *Emerging Market Analysis: Smart City Snapshot—China, Brazil and Qatar*, October 2013.

<sup>3</sup>Stakeholder perspective presented during a consultation session at the Ministry.

Figure 2: A SNAPSHOT OF ICT USAGE IN VARIOUS SECTORS



Source: Ministry of Information and Communications Technology

**Improved security mechanisms will improve the sector’s ability to analyze and share data.**

**E-health**

E-health initiatives offer health professionals easy and faster access to the information required for diagnosis and treatment. In Qatar, such initiatives currently include digitization of patient records, change management projects, standardization of vocabulary, and improvement in safety and predictive techniques.

Qatar’s Supreme Council of Health has started work on implementing e-health programs that will build the world-class healthcare system envisioned in *Qatar National Vision 2030*. The Ministry’s National Broadband Plan also includes provisions for the development of the health sector. The QNBP requires that the definition and implementation of an e-health program be initiated without delay, in parallel with the launch of next-generation hospital services. Further, the plan states that in order to ensure rapid progress, a strong political mandate is required, setting a clear governance model and identifying all areas of cooperation among Qatar’s various health-care stakeholders.

Confidentiality and security concerns related to online data are the main barrier to the progress of e-health in Qatar, according to the health sector participants at the roundtable. In addition, the health sector has vast amounts of data that currently is not efficiently utilized. Improved security mechanisms will improve the sector’s ability to analyze and share data.

**The Ministry supports the creation of a generation of highly ICT-skilled individuals who can seize the opportunities offered by technology.**

The Ministry is aware of the confidentiality and security challenges to the success of e-health initiatives. The Data and Privacy Protection Law drafted by the Ministry will provide a solid legal framework for secure online data processing. QNBP also identifies policy actions required to ensure that clearly defined standards and compliance mechanisms are in place.

### **E-education**

E-education initiatives are supported by Qatar's Education and Training Sector Strategy 2011–2016. Students and teachers have been provided with devices and high-speed broadband to support the transition to e-learning. The e-education focus in Qatar is currently on professional development for teachers, the availability of electronic content, and research and development. E-education and e-accessibility initiatives, such as the eLearning Portal and the new, accessible Qatar National Library have enabled self-learning through easy access to information. These initiatives have moved the pedagogical approach from sequential learning toward agile learning, in line with modern global methods of education. At the same time, new control mechanisms, for example, to ensure effective and safe usage of ICT and to avoid plagiarism, are needed for students and teachers. During the roundtable discussion, representatives from the education sector identified the need for control mechanisms as their main concern.

Roundtable participants agreed on the great potential for ICT in the development of the education sector in Qatar. The abundance of smartphones, as an example, provides an opportunity for quick adoption of mobile learning (m-learning), where users can learn anywhere at any time. Participants agreed on the importance of students acquiring the ICT skills required by the different sectors in Qatar. In addition, Qatar's government landscape study<sup>4</sup> indicated that the majority of government employees did not consider their ICT skills adequate and recognized the need for improvement; 75 percent of government employees said they had not received any ICT training within the last three years. The Ministry supports the creation of a generation of highly ICT-skilled individuals who can seize the opportunities offered by technology. The QNBP requires that a digital literacy curriculum be made mandatory in the national secondary education system as well as requiring that government employees receive digital training.

Further, Qatar continues to strengthen relations with local, regional, and international educational organizations to develop programs specific to the job market. The QNBP includes facilitating the exchange of research data by raising Qatar's research and development profile.

<sup>4</sup> *Qatar's ICT Landscape 2013: Government.*

## Social Media

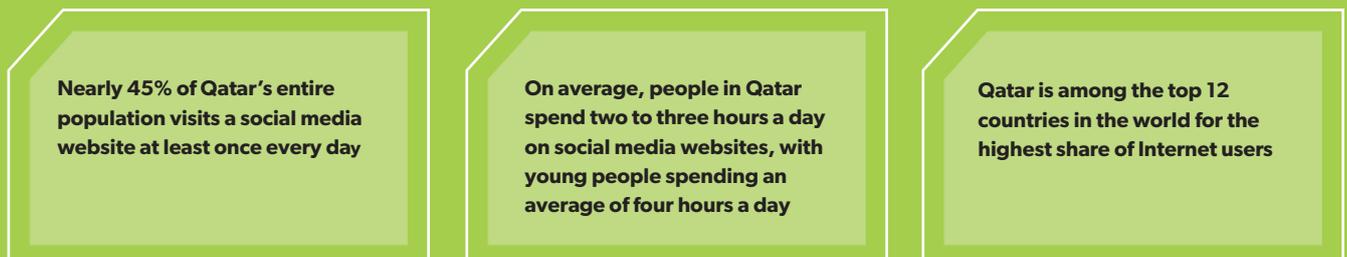
**Social media is no longer merely used for social interaction between friends and family.**

Globally, social media is no longer merely used for social interaction between friends and family, it is also used as a channel for the exchange of information and communication between various organizations and individuals. Social media is increasingly used to connect governments with citizens, for the promotion of e-government services, and for collecting information from citizens. Businesses, too, are relying more and more on social media for customer relations activities, branding, promotions, and advertising campaigns.

Use of social media by the public in Qatar is high and likely to continue to grow, providing opportunities for all sectors to engage with citizens and customers in more dynamic and interactive ways (see Figure 3). However, according to participants in the Ministry roundtable, government organizations and small businesses in Qatar have been relatively slow in embracing social media channels for reaching out to citizens and customers. *Qatar's ICT Landscape 2013: Government* states that there is room for improvement in the number of government organizations with a web presence, and many organizations say they intend to explore the benefits of social media.

The Ministry of Information and Communications Technology has drafted an e-participation policy to guide government agencies in efficient, safe, and dynamic ways of engaging with the public over the Internet and using social media.

**Figure 3: STATISTICS ON SOCIAL MEDIA TRENDS IN QATAR**



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## Cloud Computing

**Cloud computing is predicted to provide the underlying data center infrastructure upon which organizations and businesses will function.**

Cloud computing is predicted to provide the underlying data center infrastructure upon which organizations and businesses will function. Servers, processing power, and even network resources will be housed in the cloud, and cloud technology will bring about major changes in the architecture upon which IT enterprises are built. Essentially the cloud will be used to create scalable, elastic clusters of computer resources that can be adjusted and re-engineered as needed.

The Ministry roundtable argued that in the Qatari context, cloud computing should be regarded as a strategy rather than a technology. The need for metrics to standardize practices as well as to identify the value of migration to the cloud was also highlighted at the roundtable. To provide advice and guidance to businesses on usage and benefits of cloud computing, the Ministry has published Cloud Computing Guidelines.

Participants in the roundtable also identified a need for laws and policies to address their serious concerns about the protection of data and privacy rights in a cloud environment. Furthermore, the transnational nature of cloud computing needs to be reflected in any regulations, with provisions providing protection from breaches or violations of data from abroad as well. Transnational cooperation is seen as vital since different countries have different regulations for privacy and data protection. Policymakers, regulators, and commercial stakeholders in Qatar need to collaborate to develop standards, working practices, and technological tools that address the specific data and privacy concerns associated with cloud computing.

The Ministry recognizes that a number of laws and policies are needed to provide Qatar with a secure cloud environment. Relevant initiatives include the National Information Assurance Framework, which consists of various policy documents and guidelines to address information assurance with respect to existing and emerging technologies, including areas such as governance structure, risk management, security awareness, and incident management. This includes policies such as Standards for Cloud Computing Security, for government agencies. Another initiative related to creating a secure cloud environment is the draft Data and Privacy Protection Law. The Ministry's Qatar Cyber Emergency Response Team (Q-CERT) proactively seeks to identify major threats to the digital space and resolve them before they cause harm. It also provides support if attacks should occur. In addition, the Ministry of Interior's Cyber Crime Investigation Center enforces the laws and regulations targeting offenders who use sophisticated electronic methods to carry out criminal activities.

## Big Data Analytics

**The challenge is to create new tools to manage and manipulate the large datasets to generate powerful insights.**

There is growing interest in how organizations can improve service, increase performance, and enhance revenues by exploiting “big data”—the massively expanding databases of citizen, customer, and transactional information being generated through daily activities. The challenge is to create new tools to manage and manipulate the large datasets to generate powerful insights. The data is gathered from multiple channels including social networking sites, emails, and customer databases, among others, and once captured and stored, can be used for a range of applications such as performance analysis and improvement as well as predictive analysis.

Big data analytics can improve efficiency and effectiveness across the broad range of government responsibilities by improving existing processes and operations and enabling completely new ones. On the other hand, access to data is a concern for government organizations in Qatar due to the lack of a national database. A culture of guarding data, as well as security concerns, adds to the challenge of making data accessible. Figure 4 illustrates the applications of big data analytics for the public sector.

Inefficient use of data is currently also a key issue in Qatar. Most available data is unstructured and in real time. If properly managed, however, the huge amount of available data from the health sector, for example, could be used to conduct city-based health studies.

Figure 4: BIG DATA ANALYTICS FOR THE PUBLIC SECTOR



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## E-commerce

**There are however, clear signs of growth of e-commerce: online spending in the Middle East went from USD 300 million in 2011 to USD 600 million in 2012, and it is predicted that the region will reach USD 1.1 billion by 2015.**

The Ministry recognizes that the potential gains from big data are substantial for all sectors in Qatar, while at the same time understanding that big data can provide a threat to individuals' and organizations' rights to privacy and integrity and put additional pressure on cyber security efforts. The Ministry strives to ensure that big data will provide a substantial contribution to the continued development of Qatar while maintaining acceptable levels of privacy and security.

The draft Data and Privacy Protection Law demonstrates the Ministry's commitment to protecting the privacy and integrity of the Qatar public. In addition, the Ministry's Open Data Policy will promote open and transparent work practices and support the healthy exchange of data between national sectors.

E-commerce refers to the use of the Internet to conduct business transactions between individuals and organizations. The use of e-commerce can significantly benefit the economy since it gives businesses better access to customers, lowers staffing and space needs, and provides an efficient channel for promotion of goods and services. E-commerce enables smaller companies to seize opportunity of scale and reach out to the customer base they are deprived of in the physical trading market.

E-commerce is relatively limited in Qatar, despite growing retail opportunities in the country and the MENA region. There are however, clear signs of growth of e-commerce: online spending in the Middle East went from USD 300 million in 2011 to USD 600 million in 2012, and it is predicted that the region will reach USD 1.1 billion by 2015.<sup>5</sup> Ministry roundtable participants were in agreement that e-commerce will continue to grow and add value to Qatar.

However, participants highlighted a number of issues critical to the continued development of e-commerce. Awareness of e-commerce needs to be increased and trust between consumers and merchants needs to be built. Today, cash on delivery is 80 percent of the regional e-commerce,<sup>6</sup> mainly because of low levels of trust between parties. Qatar's first comprehensive Electronic Commerce and Transactions Law was enacted in 2010 followed by the Electronic Commerce and Transactions Bylaw in 2012. Merchants and buyers alike need to be assured that the laws are enforced and complied with.

The availability of efficient, affordable, and reliable e-payment options is seen as limited in Qatar. Until recently, online purchases could only be made with credit cards. The impact of Qatar National Bank's (QNB) recent collaboration with PayPal for online payments has yet to be seen. Even though this partnership is significant, at present it is likely to support customers rather than merchants.

<sup>5</sup> William Nestor, Digital Qatar (October 24, 2013).

<sup>6</sup> Ibid.

Delivery and shipping logistics are also a major concern in Qatar. The QNBP calls for a national postal address system to be in place by 2015 and legislation to ensure safe use of postal codes.

The Ministry plans an e-commerce awareness drive targeting SMEs engaging in retail activities and is also providing support to smaller businesses through preferential loans for development of e-commerce solutions. The price of existing and future e-payment solutions will be regulated to make transaction costs competitive with international benchmarks while allowing new non-bank payment initiatives.

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## Digital Convergence

**Digital convergence is substantially impacting people's work style and social life and leads to the dissolution of traditional industry boundaries.**

Digital convergence refers to the convergence of four industries into one conglomerate—ITTCE (information technologies, telecommunication, consumer electronics, and entertainment). Convergent devices such as smartphones, tablets, laptops, Internet-enabled entertainment devices and set-top boxes, converged networks and converged applications for audio and video streaming/downloading, and location-based services open up new and innovative solutions to consumers and business users. Digital convergence is substantially impacting people's work style and social life and leads to the dissolution of traditional industry boundaries.

The Ministry is scanning the digital media arena to enable and support digital convergence. The regulatory and legal framework is being updated to meet the legal challenges with converged ITTCE. The Ministry is working on a digital media strategy to set roles and responsibilities of stakeholders as well as determine the required policy and legal instruments for digital convergence.

The Communications Regulatory Authority (CRA) is working to determine the appropriateness of and benefits in expanding its mandate regarding converged regulation. Consultation with key stakeholders in the media and broadcasting industry to define the route to regulation is planned.

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## IPv6

A transition toward IPv6 is required across government and large corporate organizations in Qatar due to the exhaustion of IPv4 addresses as well as to improve routing and network packet-processing efficiency. The Ministry roundtable participants view the migration to IPv6 as a structural necessity for industry rather than an ICT trend.

The Ministry, the CRA, and service providers are responsible for monitoring compliance of critical organizations with IPv6 specifications and ensuring timely implementation of standards. The QNBP states that IPv6 compliance shall be reached in 2015.

An assessment study on IPv6 by the CRA revealed that there are few implementation plans in place in Qatar. Thus, the CRA developed and issued the IPv6 National Implementation Strategy in January 2014, providing the framework for a well-coordinated and -orchestrated adoption of IPv6 across all sectors in Qatar. The strategy recognizes that awareness of the imminent need for IPv6 migration needs to be increased without delay across the nation.



## Conclusion

The seven emerging ICT “trends” identified and described in this paper are already beginning to have an impact in Qatar. Properly managed, these emerging trends can bring substantial value to the continued economic and social development of Qatar.

ICT is transforming all sectors of society in Qatar. The Ministry of Information and Communications Technology is taking action to ensure the benefits from these emerging technologies are maximized and realized. Ministry actions include:

- Initiating projects involving ministries and government agencies.
- Forming cross-sector work groups to ensure that policy actions and targets driving the rollout of high-speed broadband are implemented, since ubiquitous and affordable access to high-speed ICT infrastructure is a prerequisite for reaping the value of these technologies.
- Developing information and awareness initiatives to demonstrate to the public the opportunities emerging technologies bring.
- Assisting all sectors in Qatar to adopt and benefit from these technologies.
- Addressing the serious privacy and security concerns associated with ICT adoption, including developing awareness and education initiatives; and revising legislation and regulations to address the new challenges emerging ICT brings to privacy and integrity, to commerce, and to new ways of accessing and broadcasting media. Qatar’s Data and Privacy Protection Law is critical for establishing the trust needed by consumers, industry, and agencies alike to adopt the new ICT.
- Finalizing the Ministry’s Open Data Policy to spur innovation. The policy balances the principle of open data with the obligation to provide security and protect privacy.

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- Developing a digital media strategy for Qatar, balancing freedom of speech with the need for content control, protection of children, filtering of offensive material, surveillance, and protection from intrusion. The open and transnational nature of the emerging ICT technologies means that no single country can work in isolation on integrity, safety, and security issues. International cooperation is a must for the mutual benefit of nations, including Qatar.

Use of emerging ICT and of the Internet continues to grow, with profound effects on social and political structures around the world. Capitalizing on these technologies will help Qatar build the knowledge-based economy that will secure a prosperous future for Qatar and its people.



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Ministry of Interior  
Ministry of Labor and Social Affairs  
Nielsen  
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