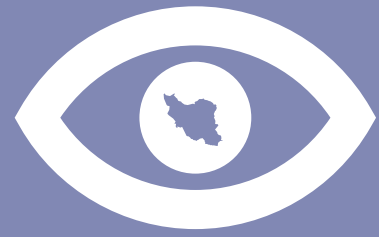


ARTICLE 19



Tightening the Net: Internet Security and Censorship in Iran

Part 1: The National Internet Project

2016

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Executive Summary

“Isolation of the clean Internet from the unclean portion will make it impossible to use the Internet for unethical and dirty businesses.” Reza Taghipour, Iran’s Minister of Information and Communications Technology, 2009 – 2012. March 26, 2011, Mehr News Agency

For years, there has been discussion amongst the Iranian Authorities of a ‘national’ or ‘clean’ Internet, while taking steps towards the completion of the ‘ National Internet Project’. This project aims to create a national, secure and ‘clean’ Internet, which would be hosted inside the country and have limited access to the content of the World Wide Web. Content within the National Internet would be blocked or filtered according to political, cultural or religious criteria, and its users’ activity would be monitored.

It was planned that the National Internet Project would be fully implemented by the end of 2015, in three major phases:

- Phase one would separate the clean Internet from its international counterpart;
- Phase two (planned for completion by 2013) would relocate all Iranian websites to domestic hosts;
- Phase three, the final phase, would set up local management of the National Internet within the country, implying total access and control by the authorities.

Execution of this three-phase plan has already deviated considerably from expectations. From the onset, severe delays and disorganisation have plagued the already daunting task. According to the latest government budget proposal, full implementation of the National Internet Project is not expected before 2019.

However, there has been progress in certain areas of implementation, as an example, Iranian authorities celebrate the fact that 40 percent of the content visited by Iranian users is now hosted domestically.

There are numerous potential benefits of the development of domestic Internet infrastructures and Internet accessibility. The National Internet Project would consist of a number of elements, from national data-hosting, to a national search engine, email service and social network, as well as faster bandwidth, greater internet penetration, and a higher proportion of Farsi-language content.

The development of domestic Internet infrastructures may also move Iran towards the creation of a faster, more advanced telecommunications infrastructure within the country, with more Iranian users connected. Additionally, increased domestic data-hosting would minimise the risk of international surveillance and other security breaches.

Catalysts for the launch of a National Internet Project also included the imposition of a sanctions regime, escalations in cyber warfare (notably the Stuxnet incident), and information security, in which the government is highly interested. In addition, the project would be expected to reduce dependence

on the World Wide Web, reducing foreign ability to exert control over connectivity.

A further central aim of the National Internet Project is to boost Iran’s technology sector, as well as the economy more widely. The World Bank has reported that a one percent increase in the bandwidth penetration rate can lead to a 1.4 percent increase in the economic growth rate of low and middle-income countries. It is also possible that the development of domestic infrastructure needed for the project could increase the direct employment rate through the creation of projects required for broadband networks, and boost the indirect employment rate through peripheral businesses.

There is potential for an advanced domestic infrastructure to promote an open, secure and reliable connectivity, essential for the rights to privacy, expression and assembly. Access to the Internet can enable individuals to both publish and receive ideas, information and opinions to and from the entire world, facilitating a free flow of content and discussion. This connectivity could also empower individuals by making information about human rights accessible, enabling debate and discussion, as well as facilitating the organisation of social and political movements and activities.

Despite the potential benefits that advancing domestic infrastructure could provide, completion of the National Internet Project as currently formulated could counter both economic and human rights benefits, as well as violating the right to freedom of expression on a national scale. Indeed, the majority of current economic growth can be attributed to an increase in connection speeds, not from the establishment of the roots of a national intranet. Completion of the National Internet Project poses a threat of disconnection of the national information network in Iran from the World Wide Web, which would be a serious technological threat to growth in the Iranian IT sector. Disconnecting the National Internet from the World Wide Web would be a serious technological threat to growth in the IT sector. Isolation from the World Wide Web will suffocate economic growth and expansion, potentially encouraging brain drain and the loss of local talent. By instead cultivating an online culture that is respectful of the free flow and unimpeded access to information, Iran can take steps to minimize such potential losses.

Given Iran’s record in violating its human rights commitments based on civil and political (including religious and ethnic) grounds, the development of projects such as the national Internet are especially concerning. The National Internet Project could pave the way for further isolation, surveillance and information retention. The intentions of the

National Internet Project were revealed by the Chair of the Telecommunication Committee in the Islamic Consultative Assembly, Ali Motahari: “The national information network will minimize the concerns arising from the divergence between the Internet and the Iranian cultural environment, socio-cultural anomalies, and security and political concerns.”

Implementation of the National Internet Project would make it easier for the government to block services, and would allow government forces to channel online activity in a way that is conducive to control and suppression. Such a disconnection from the outside world will threaten the freedom of information rights of Internet users in Iran.

A system which systematically blocks and filters content according to certain criteria (the determination of which has not involved any public consultation or transparency), without the order or oversight of an independent court cannot meet international standards on freedom of expression on the Internet.

The Iranian government has repeatedly stated its intention to monitor citizens through the National Internet. The new ease of surveillance associated with this project is also a serious human rights concern: anonymous browsing has long facilitated the expression of controversial ideas and enabled dissent in many countries. The protection of anonymity is vital to freedom of expression and the right to privacy online, allowing individuals to express opinions without fear of reprisal. These fears create an insidious ‘chilling effect’ on freedom of expression worldwide.

Furthermore, anonymity not only protects the freedom of individuals to communicate information and ideas that they would otherwise be inhibited or prevented from expressing, but also protects the freedom to live without unnecessary and undue scrutiny.

This new National Internet, as a replacement for the World Wide Web, poses a threat to the emerging trend of ‘citizen journalism’ in Iran, as well as more traditional media and research activities. Civil society and academia are also at risk from such a regime, that would deny the rights to both express and access information and ideas. The Iranian government has already tried different methods to identify activists via their online presence. The National Internet Project would empower the government on this front, especially if user records are kept and supplied to officials.

The National Internet Project risks severely isolating the Iranian people from the rest of the online world, limiting access to information and constraining attempts at collective action and public protest. At present, the National Internet Project’s implications for human rights are extremely concerning in terms of freedom of expression, freedom of information, and privacy. While the completion of the project has been delayed significantly, the scale of its potential threats to human rights must make opposition to this project a high priority.

Key Recommendations

Recommendations to the government of Islamic Republic of Iran

While ARTICLE 19 welcomes the steps taken by the Iranian government for the advancement of digital technologies in Iran, ARTICLE 19 has the following recommendations to the government in order to respect the digital rights of its people.

- The government of Islamic Republic of Iran must immediately stop all plans that would cut its people off from, or limit their access to, the World Wide Web;
- The government of Islamic Republic of Iran must stop the blocking and filtering of online content under the justification of 'national', 'clean' or 'halal' Internet. Any content filtering by the government or commercial service providers that is not end-user controlled is a form of prior censorship, and therefore not justifiable as a restriction on freedom of expression;
- The government of Islamic Republic of Iran must respect the online privacy and anonymity of its people and immediately stop subjecting them to unlawful surveillance. All surveillance must be in accordance with Article 17 of the International Covenant on Civil and Political Rights. Mass surveillance (or 'bulk collection') is an inherently disproportionate interference with human rights, and the Islamic Republic of Iran must ensure it complies with international human rights standards in this regard;
- The government of the Islamic Republic of Iran must repeal the Computer Crimes Law in its entirety, and make comprehensive legal reform to legitimise the exercise of freedom of expression;
- The government of Islamic Republic of Iran must allow non-governmental investment (private, foreign etc.) inside the country for the advancement of digital technologies in Iran;
- The government of Islamic Republic of Iran must provide universal access to the Internet in Iran i.e. all parts of the country, including rural areas, and not limited to urban hotspots.

Recommendations to the international community, including foreign technology companies

- Foreign investors and businesses must practice corporate-social responsibility in ensuring that their actions do not inadvertently empower the Iranian state in its attempts to censor, suppress and keep surveillance on Iranians' freedom of expression and information on the Internet;
- Governments, international multi-stakeholder Internet governance bodies and the United Nations must directly address Iran's adherence to principles of free flow of information and digital rights in their bilateral meetings and joint forums with Iran.

Recommendations to the Iranian online community

- The online community in Iran must as always be vigilant and aware of state controlled threats such as surveillance, identity theft, hacking, phishing, content blocking and filtering). For a detailed set of recommendations to the online community in Iran, please see Computer Crimes in Iran: Risky Online Behaviour.

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Foreword

This code presents the greatest threat to liberal or libertarian ideals, as well as their greatest promise. We can build, or architect, or code cyberspace to protect values that we believe are fundamental, or we can build, or architect, or code cyberspace to allow those values to disappear.

Lawrence Lessig, Code and other Laws of Cyberspace

Many members of the Internet community would argue that there is no architecture, but only a tradition, which was not written down for the first 25 years (or at least not by the Internet Architecture Board). However, in very general terms, the community believes that the goal is connectivity, the tool is the Internet Protocol, and the intelligence is end to end rather than hidden in the network.

RFC 1958

The Internet is a vast network, built up of interconnections between networks. It was established to provide a reliable network for communication, to connect different communities, including bringing together communities of researchers. Over the years the Internet has grown in its usage and application. It is the possibility of developing open standards, and deploying new protocols and applications that has drawn developers and users alike into online communities. To limit these possibilities is to limit the development of these much needed communities.

In the case of Iran, the focus of Internet researchers has been mostly on content and its implication for Iranian society at large. This is where the two-part series, Tightening the Net: Internet Security and Censorship in Iran comes in. Part 1 of the study, 'The National Internet Project', focuses on the development of a domestic infrastructure in Iran. This development is the precondition for all communication on the Internet and has direct implications for the ability of users to connect to the Internet. Routing, distribution of IP numbers and bandwidth, are all issues that have a direct impact on the ability of users to access content and their ability to communicate widely and within their own communities.

Worldwide, there is an increasing trend of expanding national capabilities to host websites and databases with sensitive personal and government information inside a country's geographical borders, so that data remains within its own government's control and jurisdiction. The revelations of Edward Snowden have contributed to this trend, but maintaining security, reliability, trust and integrity and control of data is not only the interest of one particular government, but that of the whole Internet community.

To maintain the Internet as a global network for communication, deliberation, collaboration, development and economic expansion is crucial; it is equally crucial that this development is based on international technical standards, such as those developed at the Internet Engineering Taskforce, as well as fundamental international human rights standards. A disconnect between the two can have harmful consequences for its community of users and the values of technology.

There are two key elements in examining Iran's Internet policies: firstly, the expansion of infrastructure and access to the Internet, and secondly, limits on the rights to freedom of expression and information, whether through content blocking, fear of surveillance, or through the consequences associated with accessing information deemed harmful by the government.

No project exposes the contradictory approach of Iranian government's Internet policy like the National Internet Project: on one hand they seek to expand access of rural areas, modernise the IP system to IPv6, and increase Internet speeds, and on the other hand they seek to develop a means to limit access to the World Wide Web, increase the government's capacity for mass surveillance, and restrict availability of content online.

**Niels ten Oever,
Head of Digital Programme
ARTICLE 19**

Glossary and abbreviations

ADSL Asymmetric digital subscriber line: a type of digital subscriber line DSL technology, a data communications technology that enables faster data transmission over copper telephone lines than a conventional voice band modem can provide.

Basij The Organization for Mobilization of the Oppressed: a paramilitary volunteer militia established in 1979 by order of the Islamic Revolution's leader Ayatollah Khomeini

CCDOC Committee Charged with Determining Offensive Content.

CCL Computer Crimes Law.

Dial-up A form of Internet access which uses the facilities of the public switched telephone network (PSTN) to establish a connection to an Internet service provider (ISP) by dialling a telephone number on a conventional telephone line

FALCON FLAG Alcatel-Lucent Optical Network: a submarine communications cable connecting several countries in the Persian Gulf and India

FATA Iranian Cyber Police.

FTTX Fibre to the x (FTTX) is a generic term for any broadband network architecture using optical fibre to provide all or part of the local loop used for last mile telecommunications

GPRS General packet radio service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications.

ICANN The Internet Corporation for Assigned Names and Numbers (ICANN) is a non-profit organization that is responsible for coordinating the maintenance and methodologies of several databases, with unique identifiers, related to the namespaces of the Internet - and thereby, ensuring the network's stable and secure operation

ICP The Internet Cache Protocol: a UDP-based protocol used for coordinating web caches. Its purpose is to find out the most appropriate location to retrieve a requested object from in the situation where multiple caches are in use at a single site.

INDMC Internet National Development Management Centre is a subdivision of Information Technology Company at the Iranian Ministry of Information and Communications Technology that presents statistics on speed tests for Internet service providers, ranks these providers, and carries out projects related to the National Internet

IP Network A communication network that uses Internet Protocol (IP) to send and receive messages between one or more computers

IPTV Internet Protocol Television

IPv4 Internet Protocol version 4

IPv6 Internet Protocol version 6: the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet

IRGC Iranian Revolutionary Guard Corps (Army of the Guardians of the Islamic Revolution)

IRIB Islamic Republic of Iran Broadcasting

ISP Internet Service Provider: the ISP is a company that providing access to the Internet, usually for a fee

ITC An organisation affiliated with the Ministry of Information and Communications Technology named "The Data Company" (currently known as the Information Technology Company, or ITC)

ITRC Iran's Telecommunications Research Centre, currently known as Information and Communication Technology Research Centre

IWOC Iranian Websites Organising Centre: an entity affiliated with the Ministry of Culture and Islamic Guidance, which is responsible for approving the content of Iranian websites

IX Internet exchange point: a physical infrastructure through which Internet service providers and Content Delivery Networks (CDNs) exchange Internet traffic between their networks (autonomous systems)

JCPOA The Joint Comprehensive Plan of Action: an international agreement on the nuclear program of Iran signed in Vienna on 14 July 2015 between Iran, the P5+1 (the five permanent members of the United Nations Security Council—China, France, Russia, United Kingdom, United States—plus Germany), and the European Union

MOI Ministry of Intelligence

MPLS Multiprotocol Label Switching: a mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.

NGN Next Generation Network: a multi-service IP network with a unified management and control structure, integrating the public switched telephone network for wireless mobile communications, the public switched data network, as well as the Intelligent Network in a packet-based public structure

NISN National Information Sharing Network

OFAC the Office of Foreign Assets Control of the US Department of the Treasury

PAP Private Access Provider

Phishing The attempt to acquire sensitive information such as usernames and passwords, by posing as a false entity in an electronic communication.

PoP A point of presence was a location where a long-distance carrier could terminate services and provide connections into a local telephone network. An Internet point of presence is an access point to the Internet.

RIPE Réseaux IP Européens (“European IP Networks”): a forum open to all parties with an interest in the technical development of the Internet. The RIPE community’s objective is to ensure that the administrative and technical coordination necessary to maintain and develop the Internet continues. It is not a standards body like the Internet Engineering Task Force and does not deal with domain names like ICANN

SAP Satellite Access Provider

SCC Supreme Council on Cyberspace.

SCRC Supreme Council of the Cultural Revolution.

STM1 The STM-1 (Synchronous Transport Module level-1): the Synchronous Digital Hierarchy ITU-T fibre optic network transmission standard, which has a bit rate of 155.52 Mbit/s

USD United States Dollars

VoIP Voice over Internet Protocol: A methodology and group of technologies for the delivery of voice communications and multimedia sessions over Internet Protocol networks, such as the Internet.

VPN Virtual Private Network: a group of computers (or discrete networks) networked together over a public network—predominately, the Internet. VPNs emerged as the leading circumvention tool for Iran’s filtering system used by Iran’s online users

WiMAX Worldwide Interoperability for Microwave Access: a family of wireless communications standards initially designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 Gbit/s for fixed stations

X.25 An ITU-T standard protocol suite for packet switched wide area network (WAN) communication

Introduction

The goal of the National Internet Project is the production of an isolated and contained information-sharing platform, whose content is mediated and controlled by the Iranian government, in adherence to political and cultural norms.

The implementation of the National Internet entails two key elements. First, significant infrastructural spending must occur, to develop the underlying hardware and resources required to create an Internet service separated from the World Wide Web. The creation of such a service will entail a near-universal improvement and development of domestic communications, particularly in order to integrate the less-developed and more rural communities of Iran.

Second, the project requires large-scale monitoring and censorship, and normative engineering, to bring Internet users in Iran to the National Internet, closing off access to the broader content available on the World Wide Web.

The national or 'clean' Internet was initially justified by fears that search engines like Google and Yahoo spied on Iranian users' data and usage practices, making it unsafe to store data on foreign servers. Indeed, one of the key objectives originally pursued by designers of the National Internet Project involved the provision of secure and stable connections over a domestic information network, i.e. a National Internet, in case of potential disconnection from the World Wide Web, either by accident or intentional action by international parties. Secure access was thus seen as a top priority, and a National Internet Project the means to achieve it.

Freedom House has highlighted Iran and North Korea as countries in which users face extensive limitations to their access of the Internet.¹ North Korea's attempts to implement their own National Internet have raised major concerns. Some reports express concerns² that Iran may implement a network similar to North Korea's Kwangmyong.³ In April 2013, by General Reza Jalali, the Head of the Iranian Passive Defense Organization, referred to North Korea as "one of the most capable countries of the world in terms of passive defense."⁴

The National Internet Project has not been presented in any single, comprehensive plan, document or policy: its parameters and elements have not been definitively enumerated or announced. It is clear, however, that some form of National Internet framework is being developed in Iran.

The 'National Internet', 'National Information Network', 'SHOMA', 'Clean', or 'Halal' Internet are the various terms used by the Iranian Officials at various times. The terms all refer to the Iran's attempts to produce a domestically isolated, monitored, and appropriately censored Internet service, independent and separate from the World Wide Web.

¹ Freedom on the Net 2014, Freedom House, December 2, 2014, Accessed: November 5, 2015, https://freedomhouse.org/sites/default/files/FOTN_2014_Full_Report_compressedv2_0.pdf

² see Riesman, Abraham, Iran's Network in a Bottle, Boston Globe, July 15, 2012, Accessed: November 5, 2015, <https://www.bostonglobe.com/ideas/2012/07/14/iranian-government-building-Internet-all-its-own/60eT7aC7P563vc4ti8aulN/story.html>; and <http://www.hrc.org/blog/entry/kazakhstan-lawmaker-calls-for-criminalization-of-same-sex-sexual-activity>

Decoding Iran National Internet, BBC Persian, April 24, 2013, Accessed: November 5, 2015, http://www.bbc.com/persian/iran/2013/04/130423_i93_iran_Internet.shtml; and

Rhodes, Christopher, Iran Vows to Unplug Internet, The Wall Street Journal, Accessed: November 5, 2015, <http://www.wsj.com/articles/SB10001424052748704889404576277391449002016>

³ The Kwangmyong is the North Korean Intranet service. Accessible by web browsers within the country, the heavily censored platform offers email communication, regime-moderated news, and a search engine for internal sources. According to an article in the Economist, "Only a few thousand people are allowed direct access to the internet. The rest are "protected" (ie, sealed off) by a local version of China's "great firewall", controlled by the Korean Computer Centre" [<http://www.economist.com/node/8640881>]

⁴ Special Focus of the Passive Defence Organization on National Internet, Tasnim News, May 1, 2013, Accessed: November 5, 2015, <http://www.tasnimnews.com/Home/Single/49997>

The Internet in Iran

According to World Bank statistics, Iran had more than 39 million Internet users at the end of 2014.⁵ Penetration rates⁶ for landline and mobile phone access in Iran are 37.7 percent and 92.2 percent, respectively, while 94.2 percent of Iranians have access to mobile Internet services. In order to further develop telephone infrastructure and access, Iran needs to invest a minimum of 2.4 billion USD in its domestic infrastructure.⁷

According to statistics released by Mehrnews Agency,⁸ 44.7 percent of urban households and 17.5 percent of rural households currently have access to the Internet. In order to connect to the Internet, 45.9 percent of Iranians use personal computers and 61.5 percent use mobile phones. According to statistics released in fall 2014, 11 percent of Iranians use General Packet Radio Service (GPRS) on their mobile devices. In 2014, 800 villages connected to the Internet. The government has expressed interest in improving Internet penetration, particularly in rural areas. Legislation approved in 2015 stipulated that 25,000 more villages should be connected to the Internet in the near future.⁹ According to an announcement by the Minister of Communications on August 26, 2015, current bandwidths for international and national traffic in Iran are approximately 207 and 2400 GBPS, respectively. The bandwidth for national traffic would increase to 4000 GBPS by March 2016. He added: “our policy is to increase the national bandwidth by 80 percent for every 20 percent increase in the international bandwidth.”¹⁰

The Minister of Communications declared on December 25, 2014 that “by the end of the eleventh government’s term (June 2017), all villages with more than 20 households (accounting for some 36,000 villages) will be connected to the Internet.” Vaezi also declared in August 2015: “25,000 villages will be provided high-speed Internet connections by the end of the year (March 2016).”¹¹ In 2014, 8000 villages were connected to the high-speed ADSL Internet, with a working budget of 79.4 million USD. By the end of 2015, 25,000 more villages will be connected, thanks to a 123.4 million-USD investment. Currently, 97 percent of Iran’s villages have at least one telephone line.

To meet the ambitious aims of the National Internet Project, Iran needs to significantly improve its domestic Internet infrastructure. On June 30, 2015 the Minister of Communications said that the infrastructure of the National Internet would be completed by March 2016. Iran has also launched project ‘TALASH’ in order to develop the transmission layer of the infrastructure network. The project has currently laid 30,000 kilometres of fibre optics and covered 31 provinces and 128 telecommunication stations. The ultimate goal of the project is to triple the capacity of the data transmission network in the transit, Internet and intranet layers, all at a cost of approximately 70 million USD.¹²

For more information about the Internet infrastructure and planned improvements needed to complete the National Internet Project see [Appendix 1](#).

⁵ Internet Users Per 100 People, The World Bank, Accessed: November 5, 2015, <http://data.worldbank.org/indicator/IT.NET.USER.P2/countries/1W-IR?display=graph>; The Statistical Centre of Iran, however, stated that there were 25’017’850 Internet users in the country as of July 2015, The latest Statistics of Internet Users in Iran, Mehr News, June 30, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2790625/آخرین-آمار-کاربران-اینترنت-سدر-ایران-%D۰وضعیت>

⁶ The ‘Internet Penetration Rate’ is the proportion of the population that has access to the Internet

⁷ To Develop 4G and Study 5G We Need a \$2.4 Billion Investment, CITNA, August 18, 2015, Accessed: November 5, 2015, <http://www.citna.ir/news/179867?>

⁸ Internet Per Capita for Iranians, Mehrnews, July 6, 2015, Accessed: November 5, 2015, <http://goo.gl/Z7GJnc>

⁹ Connecting 25,000 Villages to the Internet, ITNA, August 15, 2015, Accessed: November 5, 2015, <http://www.itna.ir/vdcf1vdm.w6deyagiiw.html>

¹⁰ National Information Network Project Never Ends, ICTNA, August 26, 2015, Accessed: November 5, 2015, <http://www.ictna.ir/id/072925/>

¹¹ Ibid.

¹² TALASH Project Triples Data Transmission Capacity, 90ICT, Accessed: November 5, 2015, <http://www.90ict.com/index.aspx?pid=99&articleid=77767>

Origins of the National Internet Project

In 2005, under the presidency of Mahmoud Ahmadinejad, rumours of the creation of a National Internet were heard for the first time. On February 7 2006, Abdulmajid Riazi, Deputy Minister of Information and Communications Technology in the Ahmadinejad administration, presented a report on the establishment of the National Internet, with a provisional budget of one billion USD, to be completed within three years. However, Mohammad Soleimani, then Minister of Information and Communications Technology, stated on February 2, 2006, “the budget for the project is not allocated yet, and I do not know from which source it will be provided.”¹³

The initial status of the project remained ambiguous in both Iranian Government and Parliament. According to Ramezan Ali Sadeghzadeh, parliamentarian and deputy chairman of Industries and Mines Committee, 10 billion Tomans of the total budget was to be allocated to the project during the first phase in 2006, and “the rest of it would be allocated in subsequent years, conditional on the success of the project.”¹⁴ However, the Joint Committees of Parliament did not approve or allocate this percentage of the budget because “MPs were not convinced of the feasibility of the concept of a National Internet.”¹⁵ Consequently, the project was halted in its early stages, remaining in limbo for several years.

No further development was made until March 2010, when the Ministry of Information and Communications Technology declared that all public organisations should relocate their websites to domestic hosts within six-months.

At the same time, information technology and hosting services for ‘.ir’ domains were included in the US sanctions against Iran, which led American companies to discontinue their hosting services for ‘.ir’ websites.¹⁶

In the same year, the Minister of Information and Communications Technology under Ahmadinejad mentioned the ‘clean’ Internet for the first time: “ICT was intended to promote peace, amicability, ethics, and the perfection of human beings; but these networks are today used by the West as a means to achieve unscrupulous goals [...] and a clean Internet should correct such wrongdoings.”¹⁷

One month after this, reports appeared claiming that initial steps were being taken to implement the ‘clean’ Internet in Iran and that the ‘unclean’ Internet would eventually be cut off: “Isolation of the clean Internet from the unclean portion will make it impossible to use the Internet for unethical and dirty businesses.”¹⁸ In March 2011, the Minister of Information and Communications Technology announced the establishment of several think tanks dedicated to the exploration of the concept of a ‘clean’ Internet: “Iran will serve as a launching pad for the clean Internet, which will soon be available to all people around the globe.”¹⁹

The ICT (Information and Communication Technology) Basij Organisation was established only months later by the Basij Resistance Force with the expressed purpose to “defend the country in soft wars.”²⁰ The Organisation issued a statement indicating that 8,000 Basijis were recruited to facilitate

¹³ National Internet Does Not Have a Clear Budget Allocation, Hamvatan Salam, February 21, 2006, Accessed: November 5, 2015, <http://www.hamvatansalam.com/news55919.html>

¹⁴ National Internet Budget Status, Shabakeh Mag, January 15, 2012, Accessed: November 5, 2015, <http://shabakeh-mag.ir/Article.aspx?id=1001963>

¹⁵ A to Z of the National Internet, Fararu, September 27, 2012, Accessed: November 5, 2015, <http://goo.gl/Y4lf9A>

¹⁶ American Servers Sanctioned Hosting .ir Domains, June 23, 2011, Accessed: November 5, 2015, <http://www.598.ir/fa/news/14647/تحریم-دامنه-دات-ای-آر-خو-وسط-پر-خی-سرور-های-آمری>

¹⁷ Clean Internet Should Correct Online Relations, Farsnews, October 16, 2010, Accessed: November 5, 2015, <http://www.farsnews.com/printable.php?nn=8907240408>

¹⁸ Clean Internet Launched, Mehrnews, March 26, 2011, Accessed: November 5, 2015, <http://goo.gl/6s1wQA>

¹⁹ Shirazi, Alireza, The Clean Internet, ITIran, March 26, 2011, Accessed: November 5, 2015, <http://itiran.com/d/58560>

²⁰ Basij Forms ICT Unit, May 29, 2011, Accessed: November 5, 2015, <http://roudsarnews.com/?p=1623>

the establishment of the 'clean' Internet in Iran: "Our country is under constant cyber attacks fuelled by technological advancements aimed at infiltrating and taking down websites."²¹

According to the Fifth Development Plan,²² the National Internet would be brought online by the end of 2015, and would be implemented in three major phases.²³ Phase 1 would cover the separation of the clean Internet from its international counterpart. In Phase 2, (planned for completion by 2013), all Iranian websites would be relocated to domestic hosts. Finally, Phase 3 would involve local management of the Internet within the country, implying total access and control by the authorities. Implementation of this three-phase plan deviated considerably from expectations. Severe delays and disorganisation plagued the implementation of the project from the outset. According to the latest government budget proposal, implementation of the National Internet Project is not now expected to be finished before 2019.²⁴

"Lack of clarity in several aspects, including but not limited to the definition of what is known as the National Internet or intranet, how it differs with a national datacentre or hosting service, its connection and affiliations to the World Wide Web, its design, procurement of hardware and software (some of which would inevitably have to be imported from Arab countries), provision of adequate security measures, its usability by organisations and individuals, provision of competitive services, the availability of sufficient potential for design and access by domestic companies, its maintenance policies, its directions and controls and lack of economic feasibility analyses, can not be easily ignored," said Alireza Salehi, Deputy ICT Minister.²⁵

²¹ Six Steps to Halal and Clean Internet, Mehrnews, June 1, 2011, Accessed: December 1, 2015, <http://www.mehrnews.com/news/1326215/توسعه-اینترنت-پاک-سیا-کک-8-هزار-جسیجی-6-گام-تا-اینترنت-پاک-سو>

²² The Social, Economic and Cultural Development Plans are 5-year plans, part of "Vision 2025", a strategy for long-term sustainable growth that are prepared by the Executive Power of Iran at the time, and presented to the Majlis for adoption into law. General Policies of the Fifth Development Plan is designed to guide government policy between 2011 and 2016 and has 45 points and includes the following articles: cultural affairs; scientific and technical affairs; social affairs, economic affairs, and politics; defense; and security affairs. The text of each plan is declared by the Supreme Leader to the president, and is sent simultaneously to the Majlis, the Judiciary, and the President of the Expediency Council.

²³ A to Z of the National Internet, Fararu, September 27, 2012, Accessed: November 5, 2015, <http://fararu.com/fa/news/127481/اینترنت-مملی-از-سیر-تا-پایان>

²⁴ Details of the National Internet Project budget up to year 2019, Tasnim News, January 17, 2016, Accessed, 25 February 2016, <http://www.tasnimnews.com/fa/news/1394/10/27/973559/%D8%AC%D8%B2%DB%8C%DB%8C%D8%A7%D8%AA-%D8%A8%D9%88%D8%AF%D8%AC%D9%87-%D8%B4%D8%A8%DA%A9%D9%87-%D9%85%D9%84%DB%8C-%D8%A7%D8%B7%D9%84%D8%A7%D8%B9%D8%A7%D8%AA-%D8%AA%D8%A7-%D8%B3%D8%A7%D9%84-99>

²⁵ National Internet Budget Status, Shabakeh Mag, January 15, 2012, Accessed: November 5, 2015, <http://shabakeh-mag.ir/Article.aspx?id=1001963>

Human rights at risk

Many of the necessary stages of development of the domestic Internet infrastructure could contribute to positively towards the improvement of Iran's telecommunications infrastructure and Internet connectivity, and could have had positive effects for the right to freedom of expression and information in the country.

Open, secure and reliable connectivity is an enabler for the rights to free expression, assembly, and privacy. Access to the Internet enables individuals to both publish and receive ideas, information and opinions to the entire world, facilitating a global free flow of content and discussion. This connectivity also empowers individuals by making information about human rights accessible, and connecting individuals to each other for the purposes of debate and discussion, as well as organising social and political movements and activities.

A National Internet Project could pose a threat to the Internet's rights-enabling features if it is followed to its conclusion, particularly if access to the World Wide Web is wholly or partially cut off, or if blocking and filtering of content is carried out.

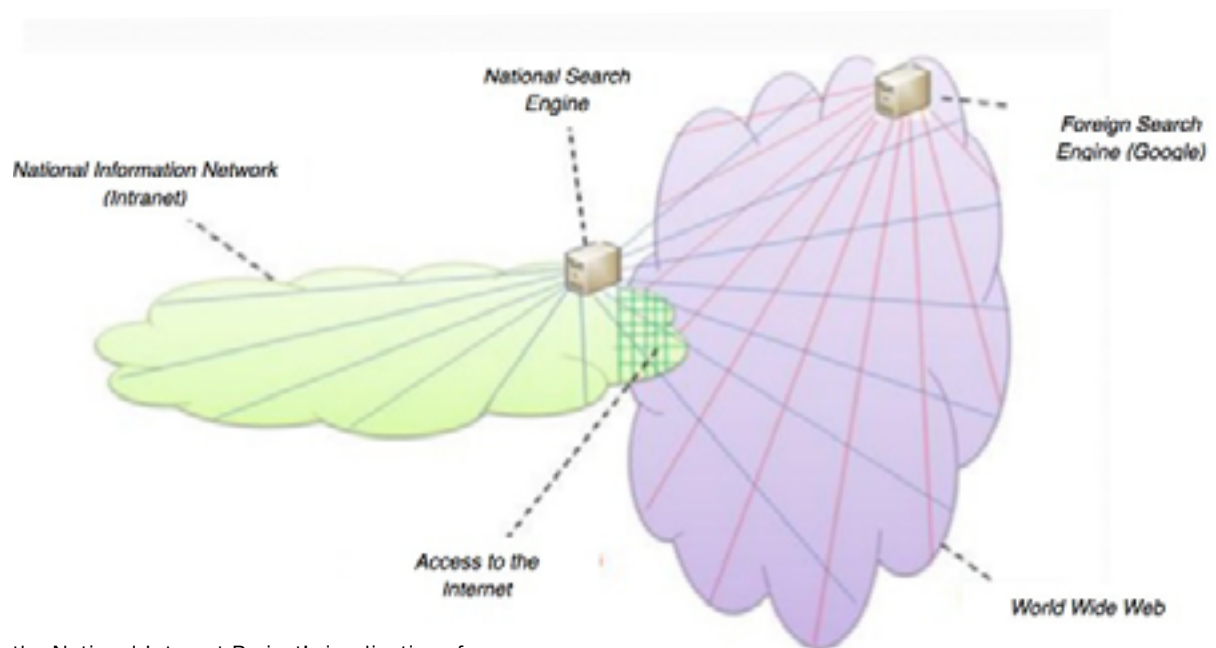
Once the Internet is made 'national', particularly once data is hosted domestically, government surveillance may be facilitated, and anonymity online curbed. The ease of government surveillance on individuals once such national data-hosting is implemented poses a threat to freedom of expression undermining the privacy and security of communication on which freedom of expression often relies. It also risks severely isolating the Iranian people from the rest of the world, limiting access to information and constraining attempts at collective action and public protest.

The Iranian government has repeatedly stated its intentions to monitor its citizens.²⁶ This surveillance creates an insidious 'chilling effect' on freedom of expression, as individuals self-censor for fear of reprisals if they feel that their online behaviour is being monitored.²⁷

²⁶ See Section 'Political Control' below

²⁷ See 'International Principles on the Applications of Human Rights to Communications Surveillance' <https://www.article19.org/resources.php/resource/37251/en/principles-on-surveillance-and-human-rights-unhrc-must-take-action-on-surveillance> and ARTICLE 19's Report 'Computer Crimes in Iran: Risky Online Behaviour' <<https://www.article19.org/resources.php/resource/38039/en/country-report-computer-crimes-in-iran-risky-online-behaviour>>

Model of National Internet–World Wide Web Cohesion, released by Iran's ministry of ICT²⁸



At present, the National Internet Project's implications for human rights are extremely concerning in terms of freedom of expression, freedom of information, and privacy, despite significant delays in the completion of the project.

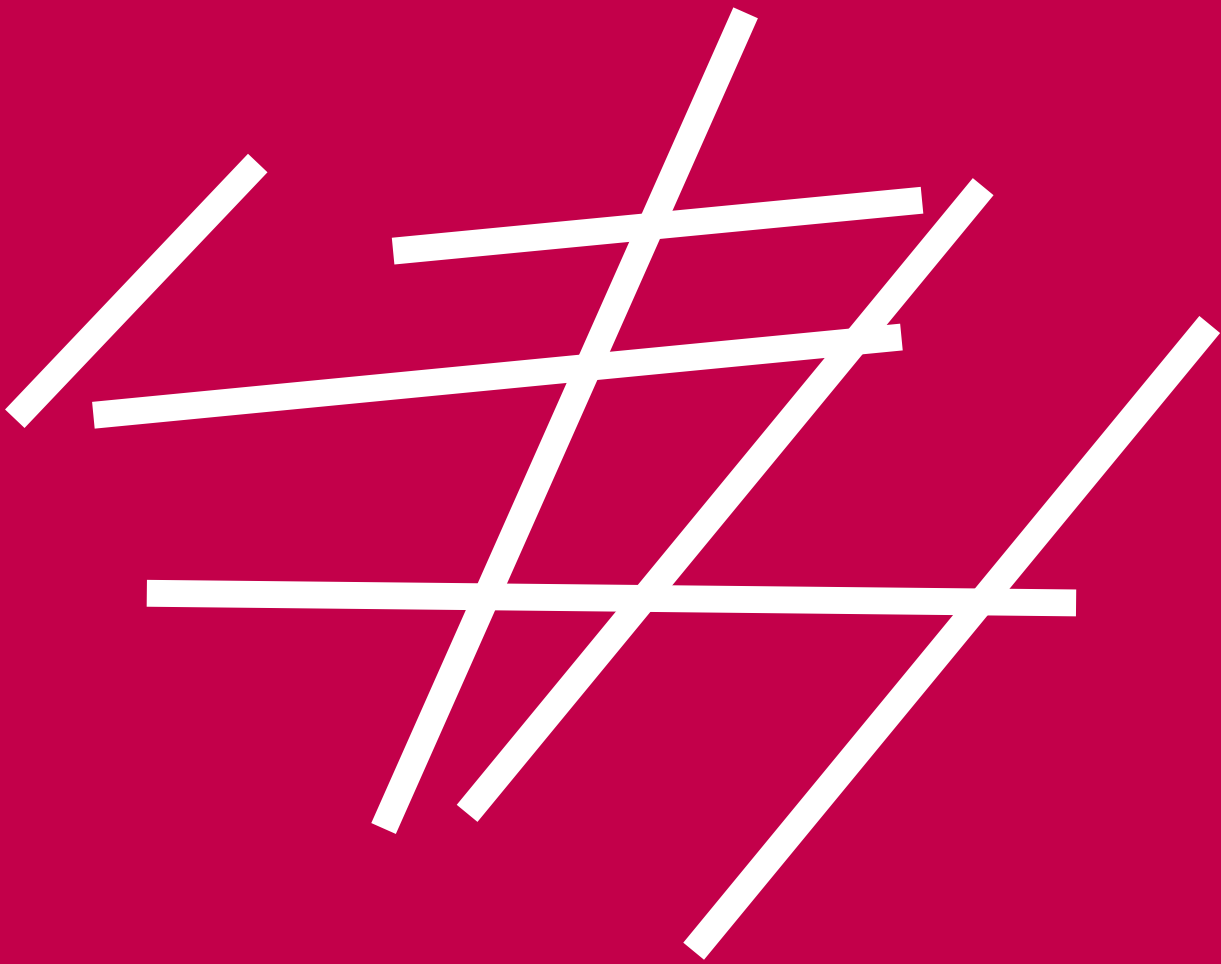
This report outlines the status of Iran's National Internet Project, and analyses potential ramifications for the rights to freedom of expression and information in Iran.²⁹

²⁸ Internet-Intranet Cohesion Model disclosed by the Ministry of ICT, available at: <http://www.itc.ir/Default.aspx?tabid=420>

²⁹ See methodology for a more detailed explanation

Section 1

Aims of the national internet project



Six core goals of the National Internet Project have been set out by the Iranian authorities:

- Laying a secure, advanced groundwork for the development of ICT in Iran
- Creating the infrastructure required for providing people with information and the latest e-services
- Establishing the foundation needed for storing and transferring information and services domestically
- Preparing the groundwork for the securing of Iran's position as a leading hub for data transmission in the region
- Cutting the costs and expenses related to Internet connections
- Benefiting from the capacities of the private sector by creating a fair competitive environment.³⁰

Given the current state of Iran's Internet infrastructure (see Appendix 1), there are many steps which must be taken to enable a situation in which a National Internet could be achieved. The following quantitative technological objectives have been stated by the Islamic Republic of Iran for the completion of the project:

- Providing Iranian users with a bandwidth of 20 MBs;
- Covering 80 percent of transactions in the form of e-payments;
- Offering electronic solutions to all government-to-government services;
- Providing 60 percent of Iranian households and all businesses with access to the national information network and the Internet by the completion of the Fifth Development Plan;
- Achieving the second highest bandwidth per capita in Middle East and North Africa;

- Gaining a 2-percent share of GDP for the ICT industry by the completion of the plan;
- Linking all public organizations to the national information network;
- Boosting national economic growth through the promotion of broadband networks by the completion of the Fifth Development Plan.³¹

During the post Iran-Iraq war era, five-year plans were developed by the Iranian government with the intention of boosting economic, social, and cultural development. According to Article 46(2) of the Fifth Development Plan (2011-2015), "measures must be adopted to facilitate establishment of a secure, private intranet."³²

Catalysts for the launch of a National Internet included the imposition of a sanctions regime, escalations in cyber warfare (notably the Stuxnet incident),³³ and information security, in which the government is highly interested. In addition, the project would be expected to reduce dependence on the World Wide Web, reducing the ability of foreign governments to exert control over connectivity.³⁴

Echoing some of the objectives of the initial developers, subsequent legislation highlighted the importance of promoting Iranian-Islamic content, enhancing digital literacy, fostering digital businesses and furthering the contribution of ICT in the economy through the full use of technology as an engine of development. Such goals would, naturally, coincide with plans improve security and reliability in cyberspace. In addition, the project intended was to promote electronic services, including such public services as 'electronic government' and productivity-boosting tools.³⁵

³⁰ Reasons for Development of the National Information Network, Ministry of ICT, Accessed: January 31, 2016, <http://www.itc.ir/Default.aspx?tabid=420>

³¹ Reasons for Development of the National Information Network, Ministry of ICT, Accessed: January 31, 2016, <http://www.itc.ir/Default.aspx?tabid=420>

³² The Fifth Development Plan, Majlis Research Center, January 20, 2011, Accessed: January 21, 2016, <http://rc.majlis.ir/fa/law/show/790196>

³³ Farwell, James P., and Rafal Rohozinski. "Stuxnet and the future of cyber war." *Survival* 53.1 (2011): 23-40.

³⁴ Reasons for Development of the National Information Network, Ministry of ICT, Accessed: January 31, 2016, <http://www.itc.ir/Default.aspx?tabid=420>

³⁵ Ibid.

Further observations were made by Mehdi Akhavan, the Vice Minister of ICT, in September 2011, who saw the creation of the National Internet as a method of addressing the concerns surrounding widespread filtering in Iran: “The National Internet will address some concerns about blocking websites since the project will reduce international data traffic.”³⁶

Economic Growth

One of the central aims of the National Internet Project is to boost the economy through the development of the technology sector, and through boosting productivity in other sectors through improved connectivity.

Increasing bandwidth, and thereby the speed of Internet access for users, is one of the central aims of Iran’s Internet development activity. According to the World Bank report in 2011, a one percent increase in the bandwidth penetration rate can lead to a 1.4 percent increase in the economic growth rate of low- and middle-income countries. Development of a National Internet increases the direct employment rate through the creation of projects required for broadband networks, and also boosts the indirect employment rate through peripheral businesses. Economic agents and online stores will benefit from high-speed transactions, and ICT companies can provide online television, online gaming and other services without any limitations.

The project aimed to provide significant improvements to communications and information technology in Iran. Of particular focus were the following areas for development:

- Creating an upgradable architecture for the national information network;
- Adapting software and hardware technologies to domestic conditions using open-source software and open-architecture development as a starting platform;
- Improving Iran’s ranking in communications development;
- Enhancing Internet penetration in Iran and approaching global standards of access;
- Improving national e-readiness indices;³⁷
- Setting the stage for scientific development of the country;
- Creating new employment opportunities and generating national income through the development of entrepreneurship in information technology;
- Enhancing security indices, reducing risks and vulnerability, and improving resilience with respect to potential sanctions;
- Establishing security measures against cyber-attacks;
- Covering domestic needs in such areas as e-business, e-health, and e-learning;
- Promoting long-distance learning;
- Creating infrastructure for remote labour (working from home).³⁸

Because of the sanctions which have been imposed on international banking activities in Iran, all online financial trades have taken place inside the country.³⁹ This has significant implications for the future of the National Internet, as increases in bandwidth could have significantly helped with the enhancements of domestic e-commerce in Iran. The Managing Director of the Islamic Republic of Iran Post Company, Hosein Mehri, reported on the growth in online trade in the country in an interview with Donya-e Eghtesad daily in August 2015. He noted: “In 2014, we delivered

³⁵ Ibid.

³⁶ Universal Filtering for ISPs, Donya-e-Eqtesad, September 17, 2011, Accessed: January 31, 2016, <http://www.donya-e-eqtesad.com/news/417673/>

³⁷ Please see Measuring the Information Society Report 2014 by ITU: http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

³⁸ Ibid.

³⁹ As of 17 January 2015 much of these sanctions were agreed to be lifted

about 5,300,000 packages with the value of 106.7 million USD, all ordered from online stores. We expect this amount to increase by 7 percent and reach 133.3 million USD in the current year.”⁴⁰

These advances also apply to other technological fields. Development of video networks, online gaming, graphics websites, web-based software, file transfer services, VPN-based tools, and remote support are among the technological fields experiencing rapid growth in the new political climate. Other growth areas include advancements in datacentres and hardware services, fibre optics, network security, and provision of digital content.

Security

As set out by the Supreme Council of Cyberspace guidelines, the National Internet was intended to establish “an entirely independent and well-secured network protected against other networks (including the World Wide Web), with the possibility of establishing the managed exchange of information within those networks”,⁴¹ as well as the implementation a network that provides secure and stable connections throughout the country.⁴²

Security concerns were directly voiced by General Reza Jalali, the Head of the Iranian Passive Defense Organization, who said in February 2012, “Yahoo and Gmail are not secure services. Anything sent through these services will be copied to their control centres before reaching the recipient.”⁴³ Ali Ahangaran, Technical Vice Minister of Intelligence, also suggested was actually created for the purpose of international spying.⁴⁴ Echoing this, Esmail Fallahi Moghaddam, Former Commander of the Iranian Police, outlined the need for domestically controlled information networks to reduce the potential of international surveillance on Iran. On January 10, 2012 in a speech about nationalizing the Internet, he declared, “We should not have the centre of our cyber information outside our borders; we can create these centres inside the country. Google is not a search engine, it is a spy machine.”⁴⁵

Again, similar concerns about the lack of security were raised by Heidar Moslehi, the Minister of Intelligence under Ahmadinejad, in February 2012 “The Internet was created by intelligence services; they do not give you the information you want, but what they want you to have, and then they gain access to your information”.⁴⁶

⁴⁰ Sharif, Shahram, Challenges of The National Information Network, Donya-e-Eqtesad, September 16, 2015, Accessed: January 31, 2016, <http://www.donya-e-eqtesad.com/news/929771/>

⁴¹ Requirements of National Information Network as the National Cyberspace Infrastructure, ICTNA, February 4, 2014, Accessed: January 31, 2016, <http://www.ictna.ir/id/060643/>

⁴² Ibid.

⁴³ National Internet's Hibernation in Chaos, ISNA, September 12, 2014, Accessed: January 31, 2016, <http://www.isna.ir/fa/print/93062112333/خواب-اینترنت-حلی-میان-هایاهوی-مسئولان>

⁴⁴ Intelligence Minister: Internet is a Threat to the Islamic Republic, DW, February 16, 2012, Accessed: January 31, 2016, <http://www.dw.com/fa-ir/%وزیر-اطلاعات-اینترنت-تهدیدی-برای-جمهوری-اسل>

In addition to improving security indices, decreasing vulnerability, planners hoped that a National Internet Project would also be able to domestically provide national searching and email services, online television or streaming, and long-distance learning resources, all of which would be more secure due to being integrated into the National Internet.⁴⁷

Political Control

Political control is one of the main driving forces behind the development of the project and the most notable threat to freedom of expression, access to information and the right to privacy. The Green Movement and Arab Spring were among the factors motivating Iran to pursue the development of a 'clean' Internet. The Internet and online media provide an increasingly vital medium for the instigation, development, and strengthening of social movements in the Middle East, including Iran.

The ubiquity of the Internet and the proliferation of access through mobile phones has also strengthened a new phenomenon in Iran: citizen journalism. This has led to a reaction by the Iranian authorities,⁴⁸ which seek to create stricter monitoring of cyberspace in order to boost the regime's ability to control and administer online activities.⁴⁹

In March 2012, Ayatollah Khamenei, the Supreme Leader of the Islamic Republic of Iran, issued a decree for the establishment of the Supreme Council of Cyberspace, intended to provide a national centre for the regulation and monitoring of online activities by the state. An important function of this organisation was to "organise an exchange of information through the World Wide Web."⁵⁰ In fact, in January 2014, two years after the establishment of this centre (and only months after the election of Rouhani), the Council approved launching a project referred to as 'the national information network' to which a budget of 33.3 million USD was allocated for the first year.

Mohammad Reza Aghamiri, a member of the Internet Criminal Content Identification Workgroup, said, "Gmail may help dissidents, as we never saw Google as a service provider suitable for Iranian users. Google is serving the CIA. The Internet is a surprise guest. We will soon launch an integrated domestic filtering system. Google has openly shown its animosity to the regime."⁵¹

Ali Motahari, the Chair of Telecommunication Committee in the Islamic Consultative Assembly, spoke of 'filtering' and 'limited-speed connections' as tools for managing cyberspace, and suggested that the national information network could be a solution to this problem: "The national information network will minimise the concerns that arise out of the divergence between the Internet and the Iranian cultural environment, socio-cultural anomalies, and security and political concerns."⁵²

⁴⁷ Rahimi, Babak. "The politics of the Internet in Iran." *Media, culture and society in Iran: Living with globalization and the Islamic state* (2007): 37.

⁴⁸ Rahimi, Babak. "The politics of the Internet in Iran." *Media, culture and society in Iran: Living with globalization and the Islamic state* (2007): 37.

⁴⁹ Rahimi, Babak. "The politics of the Internet in Iran." *Media, culture and society in Iran: Living with globalization and the Islamic state* (2007): 37.

⁵⁰ See the Supreme Leader's Decree for the Establishment of Supreme Cyber Space, available at <http://www.majazi.ir/farsi/the-supreme-council/2014-04-26-09-15-16.html>

⁵¹ Gmail May Help Dissidents, Alef, February 14, 2012, Accessed: February 1, 2016, <http://alef.ir/vdcg3w9qqak9tt4.rpra.html?143461>

⁵² Controlling Internet Content Through Filtering and Speed Limit, Farsnews, January 17, 2012, Accessed: February 1, 2016, <http://www.farsnews.com/printable.php?nn=13901027000682>

In January 2014, Minister of Culture and Islamic Guidance noted that there were 4 million Iranian Facebook users.⁵³ Based on the most recent estimates, the figure has now increased to a figure between 10 and 15 million.⁵⁴ The Minister of Culture and Islamic Guidance also stated in February 2015 that 9 million Iranians use Viber.⁵⁵ These networks are either blocked or severely interrupted in Iran, due to their potential for promoting anti-government sentiment or organising collective action. The latter is of particular concern to the government, given recent research on the importance of mass organisation and protest movements in anti-authoritarian movements.⁵⁶

“The project is intended to provide an access point to the Internet. Consequently, the Internet can be accessed only through controlled channels and, therefore, the government can reduce Internet speed or block some ports to neutralise anti-filtering measures,” Mohsen Zamani.⁵⁷

In an interview with Dana news agency Nasrollah Jahangard, former chairman of the Information Technology Company and employee of the national information network in the tenth government noted: “Iranian users, especially the youth, think that they will be monitored if they use domestic services. They fear using these services. But the truth is that users are always being monitored [regardless of the service they use].” He further highlighted an important theme: “My solution to the filtering problem is that every user should have a unique IP address. We can monitor users in both in the Internet and the national network. With a unique IP for every user, their behaviour can be analysed and catalogued. Therefore, filtering will not be an issue anymore.”

When asked if he considers monitoring to be a violation of user privacy, he responded, “I assure you that every online activity is already being monitored, but the users are not aware of this fact. We cannot use monitoring as a supervisory measure because there are legal problems with this procedure. One of the problems of our virtual space is insufficient laws governing on the users’ activities. We need to define a legal framework and inform the users that they are being monitored. We currently do not have any technical problems monitoring their activities.”⁵⁸

Language and Culture

40 percent of the content visited by Iranian users is currently in Farsi. According to the Minister of Communications, Mahmoud Vaezi, the figure should increase to 80 percent. He argued that the provision of Farsi content has resulted in increases in Internet speed and decrease in prices. This move is in the spirit of Article 34 of the Sixth Development Plan, which concentrates on “improving traffic measures so that 50 percent of content is ultimately provided domestically.” In addition Article 33 talks about the “expansion of provision of domestic content based on the country’s cultural plans by a rate of at least five times the current amount.”⁵⁹

⁵³ Culture and Islamic Guidance Minister’s interview: <http://goo.gl/Z7eIn0>

⁵⁴ Facebook Ranks First in Social Media Platforms Used by Iranians, Sinapress, July 8, 2015, Accessed: January 31, 2016, <http://sinapress.ir/news/11221/ایران-سیناپرس-شبکه-های-اجتماعی-در-ایران-11221>

⁵⁵ Nine Million Iranians Use Viber, Gerdab, February 9, 2015, Accessed: January 31, 2016, <http://gerdab.ir/fa/news/13588/9-میلیون-ایرانی-عضو-وایبر-هستند-13588>

⁵⁶ King, Garry, Jennifer Pan, and Margaret E. Roberts. “How Censorship in China Allows Government Criticism but Silences Collective Expression.” *American Political Science Review* (May 2013)

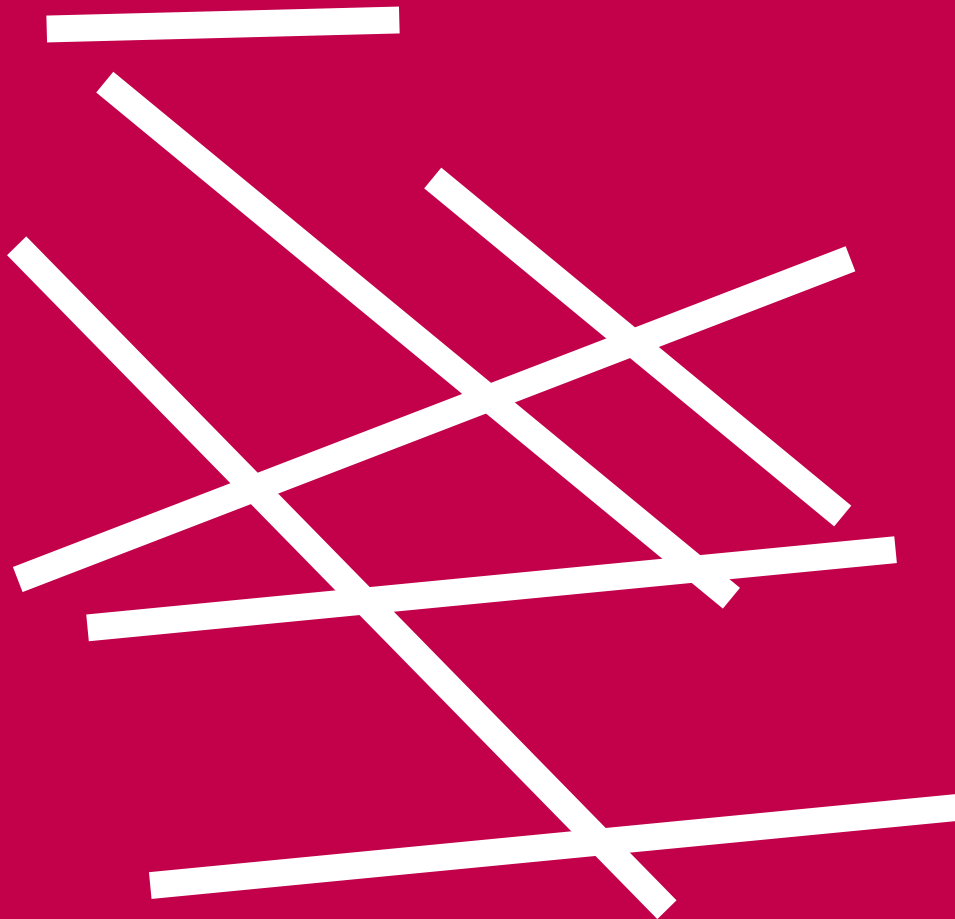
⁵⁷ New Details on Development of National Internet, Titronline, May 7, 2012, Accessed: January 31, 2016, <http://titronline.ir/vdcj.texfuqemisfzu.html?4635>

⁵⁸ All Online Iranian Users Are Monitored, Khabar Online, February 19, 2014, Accessed: January 31, 2016, <http://khabaronline.ir/detail/339557/ict/ict>

⁵⁹ The Six Development Plan available at: <http://farsi.khamenei.ir/news-content?id=30128>

Section 2

History and Development



Infrastructure and Technology

According to a spokesperson for the Iranian Parliament Board of Governors, over 4 billion USD would be required for the development of the National Internet.⁶⁰ The budget allocated to the National Internet, from its initial phase to 2012, was roughly 333.3 million USD.⁶¹ In 2014, the budgeted amount for the national information network was 410 million USD.⁶² The budget for 2015, however, was only 333.3 million USD. The budget cut was due to an influx of capital from the private sector. Of the 333.3 million USD budget noted above, 285 million USD was spent by the government in 2015 on developing infrastructure, completing technical groundwork, and preparing content for the national information network.⁶³

In order to accelerate the implementation of the National Internet, the government has changed the laws governing the activities of the private sector in this field. As a result, private companies can now obtain permits to establish datacentres. However, companies face numerous hurdles: one of their main demands is to receive cheaper data and communication services from the Telecommunication Infrastructure Company. This demand has not yet been met.

Private development has also begun in the areas of Content Delivery Networks (CDN), Internet Protocol Television (IPTV) projects, online gaming, security, and firewall expansion. A number of private companies have started developing firewalls, which are currently in use by government organisations obligated to equip such services domestically. For example, the Telecommunication Infrastructure Company has launched a Security Operations Centre (SOC) with the cooperation of Douran Co, a private security firm.⁶⁴

The Sanctions Era

Following the Iranian Revolution of 1979, the United States imposed sanctions on Iran, and expanding them in 1995 to include firms dealing with the Iranian government. In 2006, the UN Security Council (UNSC) passed Resolution 1696, and imposed further sanctions after Iran refused to suspend its uranium enrichment program.

UNSC passed seven more resolutions between 2006 and 2012, to either renew or expand its mandate. U.S. sanctions initially targeted investments in oil, gas and petrochemicals, exports of refined petroleum products, and business dealings with the Iranian Revolutionary Guard Corps. This encompasses banking and insurance transactions (including with the Central Bank of Iran), shipping, web-hosting services for commercial endeavours, and domain name registration services. When nuclear talks between Iran and Western governments stalled and were deemed a failure, they were cited as a reason to enforce stronger economic sanctions on Iran. The European Union has also imposed economic sanctions on Iran.

The sanctions regime imposed on Iran created serious issues regarding the quality, servicing, pricing, and access to up-to-date products. Iran was forced to turn to Chinese companies, often purchasing ersatz substitutes to meet vital demands. In addition, products manufactured by major European and American companies were supplied through intermediaries, often at a significant mark-up. Over the past few months, Iran has entered into negotiations with France,⁶⁵ Japan,⁶⁶

⁶⁰ Over \$4 Billion Required for Development of National Information Network, Tasnimnews, January 25, 2015, Accessed: January 31, 2016, <http://www.tasnimnews.com/Home/Single/632249>

⁶¹ A to Z of the National Internet, Fararu, September 27, 2012, Accessed: January 31, 2016, <http://fararu.com/fa/news/127481/اینترنت-ملی-از-حسیر-خاکیباز>

⁶² Private Sector Investment in National Information Network Project, Mehrnews, February 4, 2015, Accessed: January 31, 2016, <http://www.mehrnews.com/news/2485665/سرمایه‌گذار-ی-بخش-خصوصی-در-شبکه-میلی-اطلاعات-پاسخ-جه-انتقادها>

⁶³ Allocation of \$333.3 Million to National Internet Project, Mehrnews, May 3, 2015, Accessed: January 31, 2016, <http://www.mehrnews.com/news/2566650/بودجه-۳۳۳-هزار-میلیاردی-برای-اینترنت-میلی-۵-هزار-میلیاردی-بخر>

⁶⁴ Douran Group Website, Accessed: January 31, 2016, <http://www.douran.com/HomePage.aspx?TabID=4805&Site=DouranPortal&Lang=fa-IR>

⁶⁵ Iran France Negotiate Over Telecom and Electricity Industries, ISNA, August 24, 2015, Accessed: January 31, 2016, <http://www.isna.ir/fa/news/94060200920/زمینه‌سازی-همکاری-ایران-بافرانسه-در-صنایع>

⁶⁶ Iran Japan Negotiate Over Telecom, Car and Railways Industries, Shata News, August 9, 2015, Accessed: January 31, 2016, http://www.shatanews.ir/index.php?module=cdk&func=loadmodule&system=cdk&sismodule=user/content_view.php&cnt_id=254475&ctp_id=19&id=75081&sisOp=view

the US Department of the Treasury issued a General License to remove a portion of sanctions previously imposed on some communication and Internet services and equipment used for personal applications by Iranian users. A few days later, the Deputy Director of Telecommunication Company of Iran stated that negotiations would be resumed with European and Chinese companies and vendors, to supply telecommunications equipment.

The Post-Sanctions Era:

According to the Deputy Director of the Telecommunication Company of Iran, the post-sanction era can create “situations in which telecommunication networks can be improved and upgraded toward future generations of networks while the competitive environment in the global market can be taken advantage of (along with software and economic capabilities), to achieve success in development. This will not only result in a transition to IP-based networks with lower costs of maintenance, but will also create diversity in services offered over this networks, particularly in broadband networks.”

The lifting of the sanctions regime is likely to facilitate efforts to renew and upgrade the information technology infrastructure in Iran. Open access to western markets and companies may increase the pace of the modernisation of basic infrastructure, improving standards of communications for a wider demographic of citizens in Iran.

European and Asian companies are among the major parties interested in operating Iranian markets. Under the sanctions regime, three companies had active operations in Iran: Huawei and ZTE from China, and MTN from South Africa. Nuclear negotiations between Iran and the P5+1 nations and post-Joint Comprehensive Plan of Action (JCPOA) indicate that companies from Germany, Korea, and other countries may now begin operations in Iran.

Hossein Garousi, a member of the Industries & Mines Commission at the Islamic Consultative Assembly, commented on the removal of the sanctions: “We are like a country with well-maintained railways but with no railcar moving on them. Therefore, lifting the sanctions can greatly help us make advances in this area.”⁷³ Lifting of sanctions has had a direct impact on the quality of products imported to Iran, notably certificates of origin (a document attesting where a product has been manufactured), and training guides required for each product.

In financial terms, lifting of sanctions has shown potential in resolving problems in exchanges between Iranian and foreign companies.⁷⁴ These advances will have a particularly substantial effect on mobile access in Iran. According to statistics provided by the Minister of Information and Communications Technology, 71 million people in Iran currently use mobile phones. Some 27.5 million mobile phones are in active use in the country, with roughly 9 million people using the Internet via mobile phone.⁷⁵ The Deputy Director of Information Technology Company anticipated that the current 27.5 million figures for users of the web via mobile phone will reach 40 million by March 2016, a growth rate that will be aided by the opening of markets.⁷⁶

As with other aspects of the development of the National Internet Project, an influx of foreign investment in the post-sanctions era will have the potential to alter the landscape of online communications in both positive and negative ways. On the one hand, an influx of foreign investment and access to global resources and technologies could have a positive effect on online communications overall, providing the Iranian government with a means of upgrading and improving the basic telecommunications infrastructure. This would, in the short-term, provide citizens with wider and faster access to the World Wide Web, allowing a greater number of people to access content from the World Wide Web, and express themselves online. On the other hand, the establishment of such logistical resources can be used for by Iranian authorities to establish a dedicated National Internet regime, isolated from the global web i.e. the National Internet.

⁷³ IT Market in Iran Post Sanction, ISFICT News, August 9, 2015, Accessed: February 1, 2016, <http://www.isfictnews.ir/1394/05/18/it-market-in-iran-after-sanctions.html>

⁷⁴ Call for Iranian IT Experts to Return Home in Exchange for a Year of Salary, ISFICT News, August 2, 2015, Accessed: February 1, 2016, <http://www.isfictnews.ir/1394/05/11/it-specialists-at-home-one-of-their-rights-by-state.html>

⁷⁵ Statistics on Cell Phone and Smartphone Users, Serat News, May 18, 2015, Accessed: February 1, 2016, <http://www.seratnews.ir/fa/news/242307/آمار-مשתرکان-موبایل-و-گوشیهای-هوشمند>

⁷⁶ Ghasemi Naraqi, Hamed, Smartphone Users Number Around 40 Million in Iran, Digiato, May 13, 2015, Accessed: February 1, 2016, <http://digiato.com/article/2015/05/13/-40-میلیون-مستخدم-در-ایران>

Section 3

Infrastructure and Technology



This section will outline the three pillars of the development of the National Internet in Iran. Iran has achieved some of its goals to improve domestic infrastructures seen necessary for the completion of the National Internet Project. Iran has achieved only limited success in some areas of technical improvement.

Datacentres

Domestic hosting (hosting on domestic data-centres) has one major advantage for users, but only to users inside Iran, i.e. not for those attempting to access Iranian content abroad. Domestic datacentres ensure that Iranian users will be provided with faster access to websites that are being hosted domestically.

On the other hand, the major drawbacks of domestic hosting include high costs of renting domestic servers in Iran, slow access for users outside Iran, and lower rankings for domestic websites due to the slower speed at which these websites are loaded by foreign search engines such as Google and Yahoo.⁷⁷

There has been a concerted movement towards the hosting of popular and government-affiliated websites on the servers of private domestic servers in Iran. According to the most recent statistics published by the Ministry of Information and Communications Technology, 40 percent of Iran's Internet traffic is currently circulating inside the country.⁷⁸ The Fifth Development Plan of the Islamic Republic of Iran stipulates that 80 percent of the traffic should be hosted internally and the rest allocated to international hosts.⁷⁹

The government has already started to move popular websites to Iranian hosts. The result has been to increase domestic content from 10 to 40 percent. Provincial data-centres constitute one of the most significant areas of growth within the national information network. Currently, seven provincial datacentres are operational and 11 more are under construction.⁸⁰ With a budget of 1.34 million USD, the first provincial datacentre was established in March 2013 in Khuzestan.

To continue this upward trend, the government must provide hosting companies with high-speed data connections. Based on new legislation relaxing restrictions on private sector development, private companies can now freely establish data-centres. Previously, only three companies had the necessary permits to do so.

The establishment of the hosting of data and sites on national datacentres has fallen short of the state's targets. A particularly glaring indicator of this issue can be seen in the fact that until recently over 260 websites run by the Iranian government were hosted in the US, while 210 were hosted in Canada.⁸¹ Such indicators of the lack of development of a national infrastructure for hosting data suggest that a complete National Internet is unlikely to be achieved in the near future.

⁷⁷ For more information, please visit: <http://www.entrepreneurs-journey.com/550/how-to-boost-your-alexa-ranking-in-one-easy-step/>

⁷⁸ Rumors around National Information Network are Incorrect, Khabaronline, August 25, 2015, Accessed: February 1, 2016, <http://www.khabaronline.ir/detail/450415/ict/ict>

⁷⁹ Full text of The Fifth Development Plan of Islamic Republic of Iran: <http://ictb.ir/index.php/1389-12-02-12-27-38>

⁸⁰ ICT Minister Responds to Intelligent Filtering Critics, ISNA, September 8, 2015, Accessed: February 1, 2016, <http://goo.gl/gyEoFm>

⁸¹ Why 40% of Governmental Domains Hosted Abroad, Khabaronline, March 14, 2014, Accessed: February 1, 2016, <http://www.khabaronline.ir/detail/344228/ict/5078>

Similar concerns can be raised regarding the quantitative differences between national and international web hosting. Most notable are differences in prices between domestic and foreign hosting services. Examining differences between these alternatives, we find that foreign providers⁸² offer a price that is at least five times cheaper compared to the price offered by an Iranian server.⁸³

In order to meet goals of transferring the majority of online content to domestic hosts, Iran also needs to establish high-speed, secure and high-performance datacentres for national websites. Such a price disparity may imply that government attempts to nationalise Internet hosting faces an uphill battle, requiring major development and, potentially, national subsidies in order to be economically competitive and viable, relative to much cheaper international hosting.

For an expansion on the above, see [Appendices 2](#) and [3](#).

Internet Protocol Network

Online communication operates according to the Internet Protocol (IP), the method by which data is transmitted from one computer to another on the Internet. Each computer (or host) has a unique identifier (an IP address) that distinguishes it from all other hosts on the internet. Iran's Internet operates on a set of provincial IP/MPLS⁸⁴ networks.⁸⁵ The provincial networks are composed of a number of interconnected Metro Ethernets. The Metro Ethernets are connected to each other through the provincial Core Layer. Ultimately, they will be connected to the national network. [For further explanation of Metro Ethernet, see Appendix 1, *IP Networks*]

Iran predominantly uses older versions of Internet Protocol, currently relying on version 4 (IPv4). Reza Taghipour, Minister of Communications in Ahmadinejad's administration, declared, "the national information network would be based on IPv6," and, likewise, current Minister of Communications Mahmoud Vaezi spoke about the necessity of upgrading to IPv6. In 2011, the Administrative Committee on Migration to IPv6 and the Task Force on Migration to IPv6 compiled a document which described the operationalisation and scope of the project.⁸⁶

⁸² See details at: <http://my.mihanwebhost.com/announcements.php?id=144>

⁸³ See details at: <http://my.mihanwebhost.com/announcements.php?id=83>

⁸⁴ Multiprotocol Label Switching (MPLS) is a mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.

⁸⁵ National Information Network Project Forecast, ICT Ministry, available at: [http://matma.ir/documents/10180/922599/ITO- National information network traffic forecast-3-Principles of Forecasting-1390-RW02.pdf](http://matma.ir/documents/10180/922599/ITO-National%20information%20network%20traffic%20forecast-3-Principles%20of%20Forecasting-1390-RW02.pdf)

⁸⁶ Ibid.

Iran seems determined to fill this technological gap, and equip itself with all necessary requirements to sustain fast and reliable connectivity. Transition to an IPv6 standard would bring Iranian Internet infrastructure in line with global standards, as well as providing a means by which further expansion and proper allocation of addresses could be undertaken with the greatest possible efficiency.

Iran currently possesses 10 million active IPv4s. The country needs almost four times this number of IPs to be able to develop its infrastructures and provide services through the national information network. The infrastructural network should replace old equipment with new equipment that can support IPv6, but the associated costs for such an extensive project have not been announced.

Progress has been slow. The national government has arranged meetings with ICANN⁸⁷ to make advancements in this field. In addition, the Institute for Research in Fundamental Sciences recently hosted a local seminar with the presence of major RIPE NCC⁸⁸ managers to address potential avenues for advancement in this area.⁸⁹

Despite the technical challenges faced, the project of moving from IPv4 to IPv6 is under way, with some progress being made towards the stated end goals. Although a detailed budget has not yet been announced, the managing director of the Information Technology Company stated in September 2009 that the company has requested some 10 million USD to “move to IPv6 and manage Internet resources accordingly.”⁹⁰

See [Appendix 1](#) for history and development of Iran’s IP Network

⁸⁷ The Internet Corporation for Assigned Names and Numbers (ICANN) is a nonprofit organization that is responsible for coordinating the maintenance and methodologies of several databases, with unique identifiers, related to the namespaces of the Internet - and thereby, ensuring the network’s stable and secure operation

⁸⁸ Réseaux IP Européens (RIPE, French for “European IP Networks”) is a forum open to all parties with an interest in the technical development of the Internet. The RIPE community’s objective is to ensure that the administrative and technical coordination necessary to maintain and develop the Internet continues. It is not a standards body like the Internet Engineering Task Force (IETF) and does not deal with domain names like ICANN.

⁸⁹ Regional RIPE Conference in Tehran, Iran IPv6, November 19, 2014, Accessed: November 27, 2015, <http://www.iranipv6.ir/fa/news/181-ipv6>

⁹⁰ IT Projects on Halt Due to Budget Cut, DPI, August 25, 2009, Accessed: November 27, 2015, <http://www.dpi.ir/fa/news/2930/ای-کی-پروژه-موقوف-طرح-های-2930>

Fibre Optic Networks

The chief provider of Internet services in Iran, the Telecommunication Infrastructure Company, provides Internet services for organisations, universities, companies and telecommunication offices in townships through fibre optic lines and a dedicated IP network. The fibre optic network of the Telecommunication Company of Iran currently spans 56,000 kilometres.⁹¹

Authorities are currently planning to launch the Noor 2 project, whose objective is to add 12,000 kilometres of optic fibres to the network in 30 months. The municipality of Tehran and the TAVANIR Company currently possess 1,200 and 185 kilometres of fibre optics respectively. They employ fibre optic lines to control vital equipment and ensure uninterrupted internal communications.

The Minister of Communications said on June 30 2015 that the infrastructure of the national information network would be completed by March 2016. Iran has also launched project 'TALASH' in order to develop the transmission layer of the infrastructure network. The project has so far laid 30,000 kilometres of fibre optics and covered 31 provinces and 128 telecommunication stations. The ultimate goal of the project is to triple the capacity of the data transmission network in the transit, Internet and intranet layers, all at a cost of approximately 70 million USD.⁹²

One of the central goals of the National Internet project is to connect all public and governmental organisations to the network. Connection to the network is achieved through fibre optics and copper cables. The first priority of the projects Noor 2 and the Fourth Operator has been to provide governmental organisations with fibre optics required to achieve this goal.

These projects have also been tasked with the goal of providing "60 percent of households and all businesses with 20 Mbps bandwidth." The Fibre to the Home (FTTH) project is being implemented by company the Fourth Operator. The cost of the project is estimated at five billion USD. It will provide Internet ports for 6.8 million households. However, no port has been installed yet. The contract for the project Noor 2 will be signed by the end of the year. The objective of the project is to provide 12,000 kilometres of fibre optics for Iran's infrastructure network. The cost of the project has not yet been announced.

Additionally, in early 2011, Ahmadinejad's first Vice President issued an 'exclusive' permit to form a consortium dubbed 'Iranian Net',⁹³ which was to operate as 'the fourth mobile operator' in the nation. The consortium was established to provide and expand fibre optic access to both homes and businesses, with the ultimate goal of providing high-speed

⁹¹ Fiber optic Network of TCI Spans 56,000 KM, Tasnim News, March 26, 2015, Accessed: November 27, 2015, <http://goo.gl/UnU1j0>

⁹² TALASH Project Triples Data Transmission Capacity, 90ICT, Accessed: November 27, 2015, <http://www.90ict.com/index.aspx?pid=99&articleid=77767>

⁹³ See Iranian Net Consortium, Known as Forth Operator, <http://www.iranian-net.ir/index.aspx?fkeyid=&siteid=1&pageid=153>

Internet access to seven million users. The project was announced three years ago in November 2012, but has not yet become operational. The fibre optics operator was obliged to install one million high-speed ports by the end of the second year, three million by the end of the third year, and 6.87 million by the end of the eighth year.⁹⁴ In July 2015, the company promised to provide 20 MB connections in seven main cities.

The project has started in Karaj and Tehran, with a capacity of 500,000 ports. Businesses will be the first to benefit from these high-speed ports. According to the project managers, the implementation of the project will require more than five billion USD and provide 6.8 million ports.⁹⁵

In the development of the National Internet Project Iran needs to significantly improve its domestic infrastructure. This has to take form in terms of improving domestic datacentre capacities, transition to IPv6 and the completion of projects for a nationwide fibre optic network.

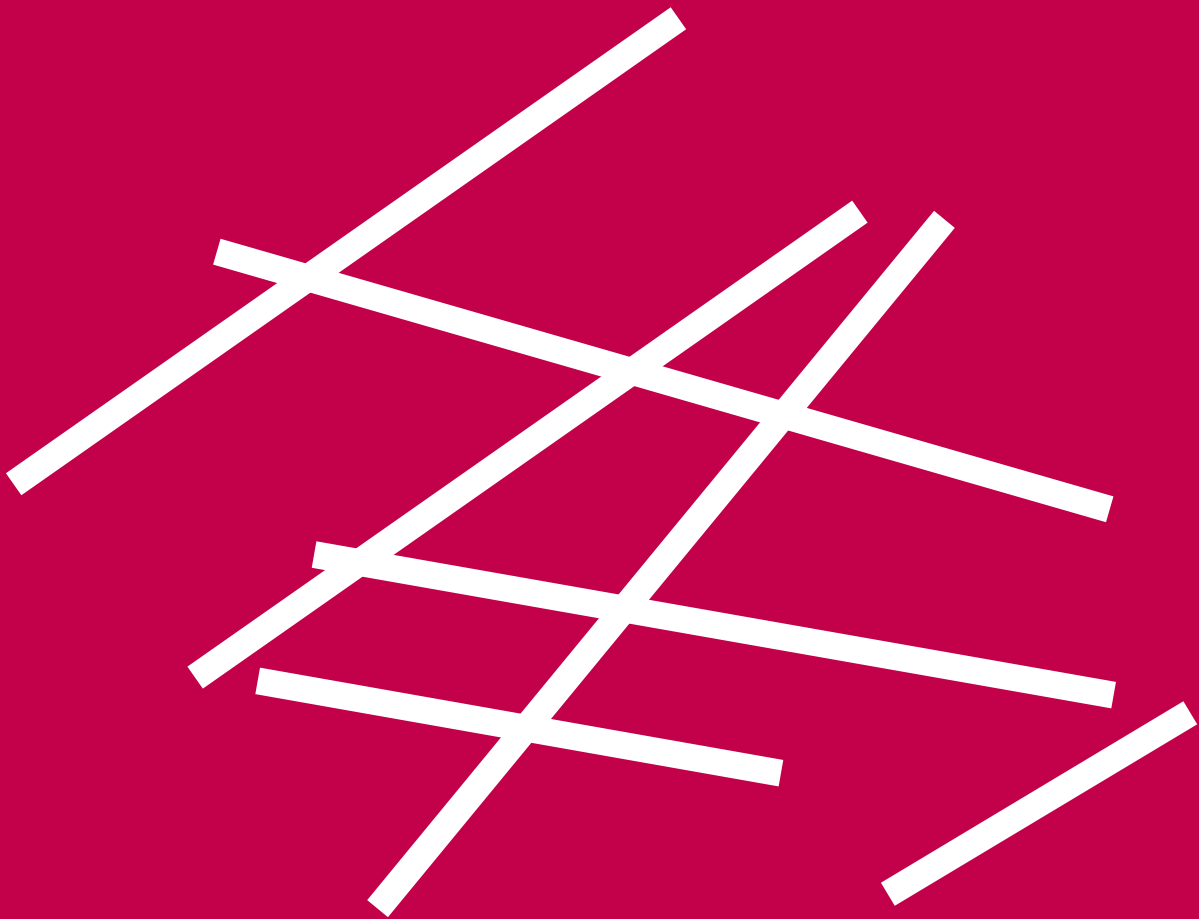
So far Iran has seen some achievements in improving its domestic infrastructure, most notably in hosting domestically produced datacentres. Yet, the development of fibre optic networks have proven to be challenging for the Iranian authorities.

⁹⁴ An Overview of the Forth Operator, ISNA, July 12, 2015, Accessed: November 27, 2015, <http://isna.ir/fa/news/94042111031/مروزی-بیر-احوال-چهارمین-ایرانتور>

⁹⁵ Ibid.

Section 4

Services and Content



Browsers

Saina is the first national Iranian browser, and was developed using open source software.¹⁰⁰ It is essentially a translation of open source browser Firefox, with some changes to its user interface.

Social Networks

Iran has a high rate of social network integration, with several domestic social networks which offer services to the public. The use of social networking tools such as Facebook and Viber is subject to high levels of surveillance, interference and blocking.¹⁰¹ Interestingly, the total number of people using domestic social network platforms combined is around 2.5 million,¹⁰² whereas Telegram has around 15 million active Iranian users.^{103, 104}

¹⁰⁰ See <http://saina.matma.ir/>

¹⁰¹ King, Garry, Jennifer Pan, and Margaret E. Roberts. "How Censorship in China Allows Government Criticism but Silences Collective Expression." *American Political Science Review* (May 2013)

¹⁰² Why Domestic Social Media Network Are Not Popular, ITNA, December 8, 2015, Accessed: February 1, 2016, <http://goo.gl/mXeFCd>

¹⁰³ Statistics on Telegram Users in Iran, Tabnak, December 26, 2015, Accessed: February 1, 2016, <https://goo.gl/dGwzQT>

¹⁰⁴ ARTICLE 19 has previously expressed concern over the security issues related to Telegram: Iran: Privacy and censorship fears around Telegram messaging app, ARTICLE 19, 18 November 2016, Accessed: February 1, 2016 <https://www.article19.org/resources.php/resource/38196/en/iran:-privacy-and-censorship-fears-around-telegram-messaging-app>

E-Government Services

Based on the instruction issued in August 2015, and in accordance with Article 46 of the Fifth Development Plan,¹⁰⁵ all governmental organisations are obliged to connect to the National Internet. The directive states that government organisations should connect to the network in 6 steps, through Internet Exchange Point (IX) using the Multiprotocol Label Switching (MPLS) mechanism. Appendix 1 of the directive lists such vital organisations and foundations as the Presidential Office, the Atomic Energy Organisation of Iran, major universities, governmental banks, the parliament, and the security-military establishment (including the IRGC and the Islamic Republic of Iran Army) as organisations that fall under the purview of this obligation.

Control of Content

In order to ‘manage’ the content of the National Internet, the Information Technology Company has established a number of frameworks, including “technological and content-related analysis”, “educational design”, “provision of components and instructive electronic content”, and an “arrangement of e-learning and evaluation courses”.¹⁰⁶

Intelligent filtering is a form of restriction on data and content transmission in which access is limited to only a part of a database.¹⁰⁷ The project was intended for domestic implementation, but Communication Minister Mahmoud Vaezi has stated that one of the three phases of execution would be outsourced to an international company. The first phase, as a part of the National Internet, was applied to Instagram on December 26 2014. However, an MP stated that it was ineffective and failed to properly censor strategic portions of the website. Mahmoud Vaezi recently reported on the implementation of the second phase with the cooperation of an international company, the name of which was not publicly stated.¹⁰⁸

Content on the Iranian national information network is created by a number of institutions including universities, seminaries (Hawzas), the National Library of Iran, religious and semi-governmental institutions, blogging service providers, Iranian social networks, video sharing websites, news agencies, and information and review websites.

¹⁰⁵ See the ICT Ministry Decree at: http://www.matma.ir/documents/10180/13021/INN-OSTAN-IX_940510_RW02.pdf?version=1.0&t=1438671869000

¹⁰⁶ Frameworks on Content Development for National Information Network, ITC, August 7, 2013, Accessed: November 27, 2015, <http://itc.ir/Default.aspx?tabid=41&mid=525&ctl=ArticleView&articleId=15079>

¹⁰⁷ Intelligent Filtering and Go-Ahead for Halal Internet, Reporters without Borders, September 9, 2015, Accessed: November 27, 2015, <http://en.rsf.org/iran-intelligent-filtering-and-go-ahead-09-09-2015,48323.html>

¹⁰⁸ Intelligent Filtering Second Phase Launched with Aid from a Foreign Company, ITNA, August 4, 2015, Accessed: November 27, 2015, <http://www.itna.ir/vdcb5abf.rhbz0piuur.html>

National Anti-Virus Software

Part of the gap in domestic content provision will be filled by seminaries and religious foundations. In 2013, 13.5 million USD were allocated to this end.¹⁰⁹ Moreover, the Ministry of Information and Communications Technology assigned 40 million USD to support private companies, universities and graduates in the development of Iranian content online.¹¹⁰ The government has plans to produce more religious content for the national information network. According to the Communications Minister, “a significant part of the national information network will be allocated to Quran-based religious content.”¹¹¹ The religious province, Qom, will be one of the first provinces to connect to the national information network.

A notable producer of online content is Tebyan.¹¹² As an institution controlled by the Islamic Development Organisation, Tebyan has clearly adopted an ideological approach to its content.

The institution is funded by the government, and its activities span a wide range of activities, including the creation of data centres, social networks, an online encyclopaedia, and mobile applications, presented in 6 languages (Arabic, English, French, Urdu, Russian, and Turkish). Aparat, an Iranian version of YouTube, is another notable content provider, as is Cloob,¹¹³ one of the first Iranian social networks. Cloob was launched in January 2005, and according to the latest statistics, is the most popular and the oldest Iranian social network with more than 2,600,000 members.¹¹⁴ Its global ranking is 1,805 and the website is the 31st most visited in Iran.¹¹⁵

Private companies and universities are currently active in the research and implementation of effective antivirus solutions. During sanctions, private companies provided these products from major vendors such as AVIRA and TRUSTPORT. Some national companies also played a mediatory role in purchasing antivirus software from international vendors. Within Iran, certain organizations are obliged to use domestic software. This is based on an order issued by Reza Taghipour, Minister of Communications in Ahmadinejad’s administration, prohibiting the import of international security software. Currently, there are more than 80 companies developing over 180 ICT products. One of the problems in this field involves a lack of a single audit organization. The Information Technology Company, Communications Regulatory Authority, Ministry of Defence and Passive Defence Organization are among the organizations with supervisory roles, but the levels of coordination among them are still low, leading to issues with organizational efficiency and redundancy.

Indeed, in an interview with the Donya-e Eghtesad daily, the managing director of the Research Centre for Informatics Industries (RCII) stated: “Unfortunately, there is a lack of a single audit organization to test and verify products. Until such an organization is created to issue valid certificates, it is unlikely that companies and organizations will use domestic products.”

¹⁰⁹ Stop Iran from Being Colonized, Rajanews, January 28, 2014, Accessed: November 27, 2015, <http://www.rajanews.com/news/163092>

¹¹⁰ Internet Disruption Reports during Nowrooz, Mehrnews, April 4, 2015, Accessed: November 27, 2015, <http://www.mehrnews.com/news/2526396/گزارش-اختلال-اینترنت-در-نوروز-اجرای-فیلتر>

¹¹¹ Significant Part of National Information Network Allocated to Religious Content, Mehrnews, July 7, 2015, Accessed: November 27, 2015, <http://www.mehrnews.com/news/2853488/اختصاص-بخش-عمده-ای-از-شبکه-مملی-اطلاعات-به-مجم>

¹¹² See: <http://www.tebyan.net/>

¹¹³ See: <http://www.cloob.com/about>

¹¹⁴ Overview of Three National Social Media Platforms, Khorasan News, January 27, 2015, Accessed: November 27, 2015, <http://khorasannews.com/PrintOnlineNews.aspx?id=1341043>

¹¹⁵ Alexa [<http://www.alexa.com/siteinfo/cloob.com>]

This may pose challenges to National Internet because not all essential software are then locally developed, and their upgrade and maintenance require access to the World Wide Web.

It appears clear that Iran has provided investment and capital for the development of dedicated domestic online services such as email servers and search engines. This trend is expected to continue in some capacity in the near future, in line with ideological technology advancements.

In particular and of specific concern should be the country's attempt to capture a sizeable share of the domestic population of online users using access-denial and promotion schemes, effectively making the substitute domestic services faster and more user-friendly than their international alternatives. Such subsidisation schemes, when matched with a concerted censorship of foreign resources, could make the National Internet versions of common Internet services the 'path of least resistance' for Iranian users who have become accustomed to online access and seek continued service. Also using government sanctioned emails, search engines, browsers, social networks, and E-government services, significantly increases the government's ability for surveillance on domestic Internet users.

Section 5

International Standards and the National Internet



As the findings of this report make clear, the National Internet Project, if fully implemented, would contravene Iran's international human rights obligations. It would seriously threaten the exercise the right to freedom of expression online in Iran, particularly if access to the World Wide Web were to be wholly or partially cut off.

Iran ratified the International Covenant on Civil and Political Rights ('ICCPR') 1966 on 24 June 1975. As such, it is legally bound to respect and ensure that the right to freedom of expression as contained in Article 19 ICCPR is protected.

While Article 19 is a fundamental right, it is not guaranteed in absolute terms. However, it can only be restricted subject to three strict conditions enunciated in Article 19 (3) ICCPR. In particular, restrictions must:

- be provided by law;¹¹⁶
- pursue one or more of the legitimate aims exhaustively listed under Article 19 (3), namely respect for the rights or reputations of others, the protection of national security or public order, public health or morals; and
- be strictly necessary and proportionate in a democratic society. Importantly, restrictions on the right to freedom of expression must be interpreted and applied strictly and narrowly.

The same principles apply to electronic forms of communication or expression disseminated over the Internet: the HR Committee has said in its General Comment No 34 that:

Any restrictions on the operation of websites, blogs or any other Internet-based, electronic or other such information dissemination system, including systems to support such communication, such as Internet service providers or search engines, are only permissible to the extent that they are compatible with paragraph 3. Permissible restrictions generally should be content-specific; generic bans on the operation of certain sites and systems are not compatible with paragraph 3. It is also inconsistent with paragraph 3 to prohibit a site or an information dissemination system from publishing material solely on the basis that it may be critical of the government or the political social system espoused by the government.¹¹⁷

In September 2011, the UN Human Rights Committee (HR Committee), the UN treaty-monitoring body, expressly recognised that Article 19 of the ICCPR protects all forms of expression and the means of their dissemination, including all forms of electronic and Internet-based modes of expression.¹¹⁸

¹¹⁶ General Comment No 34 provides the following clarification that "Since any restriction on freedom of expression constitutes a serious curtailment of human rights, it is not compatible with the Covenant for a restriction to be enshrined in traditional, religious or other such customary law." General Comment No. 34, CCPR/C/GC/34, adopted on 12 September 2011, para.24piuur.html

¹¹⁷ General Comment No. 34, CCPR/C/GC/34, adopted on 12 September 2011, para.43

¹¹⁸ *ibid*, para.12.

Content restriction: blocking and filtering

One of the central aspects of the National Internet Project is the blocking and filtering of content according to political, cultural and religious criteria. If fully implemented, there is no doubt that it would fly in the face of international standards on freedom of expression. In particular, Article 19 (1) of the ICCPR provides that the right to freedom of expression includes the individual's freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers and through any other media of his choice (our emphasis).

Filtering and blocking interfere with the right to seek and exchange information and ideas: filtering and blocking technology are blunt instruments, which tend to over-block or under-block content, with the result that legitimate content may be unduly restricted. Website blocking can only be compatible with international standards on freedom of expression in cases where it has been provided by law and a court has determined that a blocking measure is necessary in order to protect the rights of others, or in the case of filtering, where it has been voluntarily adopted by the individual user.

Blocking measures must always comply with the three-part test under Article 19(3) ICCPR.¹¹⁹

In this respect, there are criteria which must be met in order for website blocking and filtering to be justified under international law:

- a. Blocking and filtering provisions should be clearly laid out by law;¹²⁰
- b. Any determination on what content should be blocked must be undertaken by a competent judicial authority or a body which is independent of any political, commercial, or other unwarranted influences;
- c. Blocking orders must be strictly limited in scope in line with the requirements of necessity and proportionality under Article 19 (3);
- d. Lists of blocked websites together with full details regarding the necessity and justification for blocking each individual website should be published.
- e. An explanation should also be provided on the affected websites as to why they have been blocked.

So far, the proposed plans for the development of the National Internet indicate that the above criteria will not be met.

¹¹⁹ *ibid*, para. 81

¹²⁰ *Ibid*

Surveillance and the Right to browse anonymously

The completion of the project would provide the Iranian government with the infrastructure to monitor and conduct surveillance on all of its users: it would thus seriously limit the ability of Iranian Internet users to exercise their right to freedom of expression anonymously online.¹²¹

David Kaye, UN Special Rapporteur on freedom of expression noted in his June 2015 report of 2015 on encryption and anonymity that, because anonymity facilitates opinion and expression online, states should protect it and not restrict the technologies which make it possible.¹²² His 2015 report also observed that restrictions on anonymity, and communications surveillance, have a chilling effect on the free expression of information and ideas.¹²³

¹²¹ See ARTICLE 19's Right to Online Anonymity, https://www.article19.org/data/files/medialibrary/38006/Anonymity_and_encryption_report_A5_final-web.pdf

¹²² Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, David Kaye, A/HRC/29/32, 29 May 2015 (the 2015 Report of the SR on FOE), paras 12,16 and 56.

¹²³ UN Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, A/HRC/23/40, 17 April 2013 (the 2013 Report of the SR on FOE), paras 48-49.; see also the International Principles on the Application of Human Rights to Communications Surveillance, May 2014, <https://en.necessaryandproportionate.org/text>

Conclusions



The National Internet Project and The Need for Concern

Iranian authorities are committed to the National Internet project: steps have clearly been taken towards that aim. The National Internet Project has been in line with Iran's stated ambitions as a regional actor, particularly in the field of information technology. Such aspirations have been documented in the Fifth and the Sixth Development Plans. Along the way, the National Internet Project has experienced several modifications, both in terms of its practicality and ideological underpinnings.

The National Internet Project, even while facing challenges in implementation, is developing the infrastructure to replace elements of the World Wide Web with isolated domestic variants, posing a clear threat to human rights in Iran.

The completion of National Internet Project is too serious a threat to human rights in Iran to allow its delays and mismanagements prevent or delay the human rights community in considering the possible ramifications of such a project. Regardless of whether the Iranian authorities are able to deliver a National Internet in the near future, it is essential that the Iranian authorities pursue a path that leads to the improvement of Internet access in Iran while still seeking to safeguard the human rights of Internet users in Iran.

This development could also be particularly concerning for minority groups. The Baha'i Institute for Higher Education (B.I.H.E) or Baha'i Open University, is a non-profit university founded in 1987 for Baha'i youths excluded from access to government-sponsored universities after the revolution. The institution gradually expanded its provision of degree programs, offering five associate, 18 bachelor's and 14 master's programs. Baha'i Open University also provided a number of online courses. Between May 22 and May 24 2011, security agents entered more than 30 Baha'i students' houses in Tehran, Karaj, Isfahan, Shiraz, Zahedan and, Sari, confiscating their computers, books and notes. In addition, two private properties in which courses were held were sealed off. More than 20 Baha'i citizens were arrested, some were convicted to 2-5 years in jail. Monitoring the activities and interactions of university professors with scholars outside of Iran, along with the erection of barriers in communication between international professors and Iranian students can cause problems for minority communities such as the Baha'i.

In February 2012, Iranian citizens experienced difficulties in accessing the Internet and email services. In an interview with Arman Newspaper, Abolfath Niknam, then a member of the Commission of Industries at the Islamic Consultative Assembly and the Parliament's Representative in the Executive-Legislative Joint Committee for Organising the Internet, hinted at the role of security agencies in these problems: "Some authorities limit connections due to a number of problems. This is quite normal. Keeping the country secure is clearly more important than the costs arising out of losing connections for a few hours. In developing our communication systems, we need to be wary of potential security threats."¹³¹

Speaking on the National Internet Project, Niknam argued that the project "remarkably enhances our security" and "improves our ability in domestic control over the network". He continued, "The Ministry of Information and Communications Technology must note that the existing systems should not be disconnected before the project is complete. The National Internet Project must first be completed and tested. Only once this is done can we deny access to other existing systems, and then only over a scheduled process. The National Internet can replace the existing Internet network and cover all users' needs so that users won't feel that they need access to the World Wide Web."

¹³¹ Bozorgmehr, Keyvav, Iran, Remote Island in World Wide Web, Roozonline, February 21, 2012, Accessed: November 5, 2015, <http://www.roozonline.com/persian/news/newsitem/article/-6c9e60765a.html>

The National Internet Project: Economy and Security

The National Internet Project has provided the impetus for some positive development in Internet infrastructure in recent years.

The growth of domestic datacentres and hardware services, fibre optics, network security, and provision of digital content will offer many positives to Internet users in Iran. However, these areas of growth will likely be adversely affected by the nationalisation of the Internet. The isolation of Iranian Internet users from the World Wide Web, limitations on their human rights and the limitations on their access to the international market can fundamentally effect the materialization of these economic benefits.

Indeed, the majority of current growth can be attributed to an increase in connection speeds, not from the establishment of the early stages of the National Internet Project. Disconnection of the National Internet from the World Wide Web would be a serious technological threat to growth in the ICT sector. A failure to update applications, lack of access to educational resources in the field of technology, isolation from international e-commerce, and a lack of contribution to the process of international content provision are among the main threats to growth in this area.

Iran is obliged to adhere to the constitution, and to promote the independent growth and development of private enterprise in the IT sector. Iranian policy has the potential open the field for foreign investment (which can bring in up to 100,000 new jobs and lead to economic growth).¹³² Iran's economy would benefit from welcoming private investment and helping finance growth in the provision of free access to fast Internet in all parts of the country.

Western corporations encouraging a larger presence and deeper integration in the rapidly-developing IT sector may prevent Iran from moving towards the North Korean model of isolation. Investment, entrepreneurship, and the growth of nascent businesses will prevent the national isolation and suppression. Corporations could be particularly encouraged to invest in Iranian talent, taking advantage of the nation's vast supply of human capital.

Isolation from the World Wide Web will, in the long-run, suffocate economic growth and expansion, potentially encouraging brain drain and the loss of local talent. By cultivating an online culture based on the free flow of information, Iran can take steps to minimise these losses. Iran currently ranks third in the number of engineering graduates matriculated.¹³³ it would be in the nation's economic interest to encourage their retention. Open access to information can also improve global perceptions of Iran, leading to potential growth in tourism, small business development, and investment in local entrepreneurship.

¹³² ICT Sector Can Create 100,000 Jobs a Year, Dolat, May 17, 2014, Accessed: November 27, 2015, <http://www.dolat.ir/NSite/FullStory/News/?Serv=8&Id=242636>

¹³³ See Forbes report at: <http://www.forbes.com/sites/niallmccarthy/2015/06/09/the-countries-with-the-most-engineering-graduates-infographic/>

Recommendations

Recommendations to the government of Islamic Republic of Iran

While ARTICLE 19 welcomes the steps taken by the Iranian government for the advancement of digital technologies in Iran, ARTICLE 19 has the following recommendations to the government in order to respect the digital rights of its people.

The Government of the Islamic Republic of Iran must:

- immediately stop all plans that would cut its people off from, or limits their access to, the World Wide Web;
- stop the blocking and filtering of all online content under the justification of 'national', 'clean' or 'halal' internet. Any content filtering by the government or commercial service providers and that is not end-user controlled is a form of prior censorship, not justifiable as a restriction on freedom of expression;
- respect the online privacy and anonymity of its people and immediately stop subjecting them to unlawful surveillance. All surveillance must be in accordance with Article 17 of the International Covenant on Civil and Political Rights. Mass surveillance (or 'bulk collection') is an inherently disproportionate interference with human rights, and the Islamic Republic of Iran must ensure it complies with international human rights standards in this regard;
- repeal the Computer Crimes Law in its entirety, and make comprehensive legal reform to legitimise the exercise of freedom of expression;
- allow non-governmental investment (private, foreign etc.) inside the country for the advancement of digital technologies in Iran;
- provide universal access to the internet in Iran i.e. all parts of the country, including rural areas, and not limited to urban hotspots.

Recommendations to the international community, including foreign technology companies

- Foreign investors and businesses must practice corporate-social responsibility in ensuring that their actions do not inadvertently empower the state in its attempts to censor, suppress and keep surveillance on Iranians' freedom of expression and information on the Internet.
- Foreign businesses must have a larger presence and deeper integration in the rapidly-developing digital technology sector in Iran. Investment, entrepreneurship, and the growth of nascent businesses are natural antidotes to national isolation and suppression.
- Governments, international multi-stakeholder internet governance bodies and the United Nations must directly address Iran's adherence to principles of free flow of information and digital rights in their bilateral meetings and joint forums with Iran.

Recommendations to the Iranian online community

- The online community in Iran must as always be vigilant and aware of state controlled threats such as surveillance, identity theft, hacking, phishing, content blocking and filtering).
- For a detailed set of recommendations to the online community in Iran, please see Computer Crimes in Iran: Risky Online Behaviour.

Methodology

This report examines the origins and development of the Iranian National Internet project. The report's analysis will shed light on the implications of such an initiative, and suggest ways in which its adverse effects could be minimised.

The findings and recommendations of this report are based on ARTICLE 19 core values in protecting freedom of expression and information. In order to paint a comprehensive picture of potential consequences of such an ambitious project, this report has considered, analysed and documented some of the potential effects the project may have on social and economic rights in Iran.

The data collected and analysed for this report is comprised of extensive surveys of primary and secondary source materials related to the National Internet venture. All figures within the report have been cross-checked and validated to ensure their validity and to meet high standards of research integrity.

Access to objective information is often restricted in Iran. However, the information used in this report was verified by sources both inside and outside of Iran prior to its publication.

To fully examine the possible effects of the project, this research has also looked at wider academic and specialist publications on social and technological effects that development of National Internet may have in Iranian society.

Data used in this report was collected between September 2015 to December 2015. While statements released after this date will not be analysed as part of this report, no development after December 2015 has suggested a significant change in Iran's aspirations for the development of the National Internet project, and therefore the findings of this report remain relevant and highlight the threat to the freedom of expression and access to information possessed in the citizens of Iran.

NB the exchange rate used throughout this report is 1 USD:3000 Tomans

Appendix 1: Iran's Internet: Infrastructure and Architecture

a. Internet use in Iran

According to World Bank statistics, Iran had more than 39 million Internet users by the end of 2014¹³⁴. Based on the statistics published by the Statistical Centre of Iran, however, there were 25,017,850 Internet users in the country as of July 2015.¹³⁵ Part of the discrepancy here might be explained by differences in the definition of Internet users. The concept is defined to as an individual who has used the Internet over the past three months. The statistics show that 52.47 percent of Iranian households have access to computers. The penetration rates for landline and mobile phone access in Iran are 37.66 percent and 92.2 percent, respectively. Furthermore, 94.2 percent of Iranians have access to mobile Internet services. In order to further develop telephone infrastructure and access, Iran needs to invest a minimum of 2.4 billion USD.¹³⁶

Iran currently provides four types of Internet services: GPRS, WiMax, Dial-up and ADSL.¹³⁷ The Telecommunication Infrastructure Company is the sole organization to import and distribute bandwidth in Iran. The company uses two ASN IDs: AS48159¹³⁸ and AS12880.¹³⁹ Using these IDs, it is possible to track the sources and distribution of Internet services in the country.

Currently, Iran's Internet gateways include: TeliaSonera, CW, Telecom Italia, Omantel, Flag Telecom Global Internet, Delta Telecom, Tellcom Iletisim Hizmetleri, Tinet S.p.A., and Caucasus Online. Iran is connected to the FLAG Alcatel-

Lucent Optical Network (FALCON) from the south. The network connects all Arab countries in the Persian Gulf, India, Sri Lanka, Egypt, Sudan and Maldives to each other and to the World Wide Web.

Map of the FALCON Network



The southern maritime boundaries of Iran's Internet are defined as follows. First, division along a line traversing Bandar Ganaveh, Khark Island and Soroosh Platform from Kuwait, another line connecting the Gulf Bridge International Cable System (GBICS) through Bandar Bushehr, a boundary connecting the FALCON through Bandar Abbas and Bandar Chabahar, and a final connection to Oman (OMRAN/EPEG

¹³⁴ SInternet Users Per 100 People, The World Bank, Accessed: November 5, 2015, <http://data.worldbank.org/indicator/IT.NET.USER.P2/countries/1W-IR?display=graph>

¹³⁵ The latest Statistics of Internet Users in Iran, Mehr News, June 30, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2790625/وضعیت-ایران-اینترنت-در-آمار-آخرین-آمار-کاربران-اینترنت-در-ایران-وضعیت>

¹³⁶ To Develop 4G and Study 5G We Need a \$2.4 Billion Investment, CITNA, August 18, 2015, Accessed: November 5, 2015, <http://www.citna.ir/news/179867?>

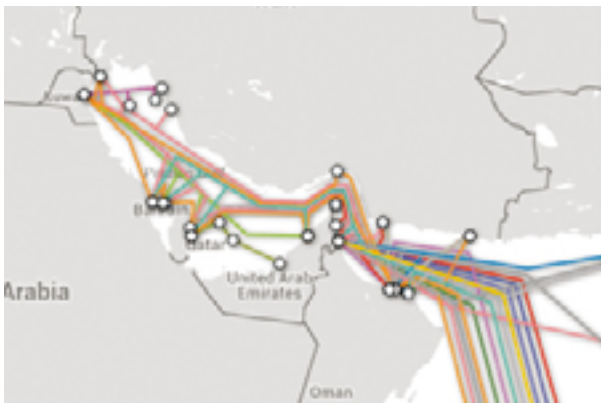
¹³⁷ General packet radio service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications. WiMAX (Worldwide Interoperability for Microwave Access). Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a connection to an Internet service provider (ISP) by dialing a telephone number on a conventional telephone line. Asymmetric digital subscriber line (ADSL) is a type of digital subscriber line (DSL) technology, a data communications technology that enables faster data transmission over copper telephone lines than a conventional voiceband modem can provide.

¹³⁸ For more details, see: <https://stat.ripe.net/AS48159#tabId=routing>

¹³⁹ For more details, see: <https://stat.ripe.net/AS12880#tabId=routing>

Cable System) and the United Arab Emirates through Bandar Jask and Bandar Chabahar. 48 percent of Iran's bandwidth is provided through the Chabahar Terminal.¹⁴⁰ Other Internet terminals connect via Turkey (through Sarv and Bazargan), Azerbaijan (through Astara), and Armenia (through Nurduz).

Southern Maritime Boundaries of Iran's Internet¹⁴¹



Until 2005, Iranian bandwidth was provided through a cable connecting Bandar Jask to Fujairah in the United Arab Emirates. By 2009, however, Iran added eight more gateways to the network due to frequent disconnections in the Jask-Fujairah cable. This occurred in concert with increases in bandwidth entering Iran, with the most significant increase

happening during the Rouhani administration. The following table provides a summary of the increases in bandwidth between 2005 and 2015.

Changes to Bandwidth Provision in Iran:¹⁴²

Date	Bandwidth
July 2005	11 STM-1
October 2006	20 STM-1
March 2010	173 STM-1
March 2011	221 STM-1
August 2012	467 STM-1
August 2013	527 STM-1
January 2014	695 STM-1
March 2015	2350 STM-1

Ordinary users can connect to the Internet through WiMax, ADSL, Dial-up and GSM services. ADSL2, a more advanced version of ADSL, and TD-LTE, an enhanced version of WiMax, are also currently operational. In August 2015, 10 million clients used WiMax and ADSL and 20 million clients used GSM (high-speed mobile

¹⁴⁰ Budget Allocation for Sistan and Baluchistan Province Telecom Infrastructure Renovation, IRNA, June 15, 2015, Accessed: November 5, 2015, <http://padidehnews.com/?p=527264>

¹⁴¹ For more details, please see: <http://www.submarinecablemap.com/#/>

¹⁴² Note: each STM-1 equals 155 Mbps.

Internet) services.¹⁴³ Currently, GSM services are provided by four companies. The following companies also provide LTE, G3, and GPRS services:

- RighTel (affiliated with the Social Security Organization)
- Mobile Telecommunication Company of Iran (MTC), known as the First Operator (affiliated with the Telecommunication Company of Iran)
- Taliya (affiliated with Iran Mobin Electronic Development Company and IRGC Cooperative Foundation)
- Irancell (owned by the South Africa-based MTN Group and Iran Electronic Development Company (IEDC). Affiliated with the Islamic Revolution Mostazafan Foundation)

Households and companies can be connected to the Internet through copper cables or fiber optics, using DSL or Dial-up services. The Telecommunication Company of Iran is responsible for distribution of connection lines. Access to the Internet is also provided through the following 11 Private Access Providers (PAPs):

- Asiatech
- Roham Pars (DATAK)
- Neda Gostar Saba
- Arya Resaneh Tadbir (Shatel's representative)
- Pars Online
- Kavir Yazd Communications Development Pioneers
- Dadeh Pardazi Fan Ava
- Dadeh Gostar Asr Novin
- Asr Enteghal Dadeh
- Karamin
- Laser

However, this practice may be short-lived, as PAPs' operational permits will expire in the upcoming months. Pending the approval of the Communications Regulatory Authority, Fixed Communication Providers (FCPs) will replace PAPs.¹⁴⁴ In fact, 11 PAPs will be replaced with 18 FCPs, which will provide fiber optics services as of March 2016. FCPs are expected to pay 7 million USD to receive such permits, and plan to "provide an annual minimum of 20'000 Internet ports outside the provincial capitals." Furthermore, they will be obliged to provide three percent of their annual income to the government. There are also seven Satellite Access Providers (SAPs) in Iran. The following SAPs make preparations and provide broadband data transmission services through satellite communications:

- ICASAT Co.
- Iran Solar Co.
- Saman Satellite Communications Group
- Sazeh Pay Development Co.
- Farasat Communications Development Co.
- Arian Mahvareh Co.
- Pars Online Communications Co.

The Minister of Communications said on June 30, 2015 that the infrastructure of the national information network would be completed by March 2016. Iran has also launched project "TALASH" in order to develop the transmission layer of the infrastructure network. The project has currently laid 30'000 kilometers of fiber optics and covered 31 provinces and 128 telecommunication stations. The ultimate goal of the project is to triple the capacity of the data transmission network in the transit, Internet and intranet layers, all at a cost of approximately 70 million USD.¹⁴⁵

¹⁴¹ For more details, please see: <http://www.submarinecablemap.com/#/>

¹⁴² Note: each STM-1 equals 155 Mbps.

¹⁴³ Progress Report Released by ICT, Accessed: November 5, 2015, <https://shiraz.ict.gov.ir/fa/tic/tic-عملکرد-گزارش>

¹⁴⁴ Eighteen Internet Operators Enter Iran Market, Mehrnews, September 1, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2900591/۱۸-اپراتور-جدید-وارد-بازار-اینترنت-می-شوند-۸>

¹⁴⁵ TALASH Project Triples Data Transmission Capacity, 90ICT, Accessed: November 5, 2015, <http://www.90ict.com/index.aspx?pid=99&articleid=77767>

The Telecommunication Infrastructure Company has also designed six infrastructure development projects named Omid 1, Omid 2, Omid 3, Omid Payesh, Omid Palayesh and Omid Amn. The objective of the Omid projects is to increase the bandwidth of the transit, Internet and intranet layers, improving PoPs in 170 locations and enhancing the qualitative measures of the network. The cost of these six projects is projected at 2.7 billion USD.¹⁴⁶ In May 2015, the Telecommunication Infrastructure Company further called for bids for the initiation of project “Noor 2”, whose goal was to develop communication infrastructures through the implementation of 12,000 kilometers of fiber optics. The cost of the project has not yet been announced. As stipulated by the Fifth Development Plan, 18000 high-speed Internet ports should be distributed to provide service to the more than 8 million ADSL users in Iran.¹⁴⁷

The remaining 10 million ports will likely be furnished at a cost of 15 billion USD.¹⁴⁸

Funding for these projects, which will lay the groundwork and infrastructure necessary for the development of a National Internet, will be provided through a combination of sources. According to a spokesman of the parliamentary presiding board, the national information network requires an additional investment of over 4 billion USD.¹⁴⁹ In 2014, a budget of 410 million USD was allocated to the national information network.¹⁵⁰ The budget decreased to 334 million USD in 2015 because a fraction of the costs was covered by the private sector. Of the 334 million USD, 285 million was allocated to new infrastructural development, renewal, and content provision for the national information network.¹⁵¹ This was counterbalanced by an estimated 1.54 billion USD of profit from investments in information technology in 2013.¹⁵² Estimates suggest that the government may expect a healthy return on investment, based on the promising trends seen in the past two years (estimated figures for the year 2014 were also at 1.5 billion USD).¹⁵³ Solid returns and healthy profits from the IT sector could well fund the development of the ambitious National Internet project, whose infrastructural development is currently underway.

¹⁴⁶ OMID: Six Infrastructure Development Projects Launched, Telecom News, March 3, 2014, Accessed: November 27, 2015, <http://telecomnews.ir/persian/ModulesPage.aspx?modulename=News&action=viewtext&news=1223>

¹⁴⁷ Number of ADSL Users in Iran, Dana, February 6, 2015, Accessed: November 5, 2015, <http://www.dana.ir/News/234749.html>

¹⁴⁸ ICT Sector Requires a \$50 Billion Investment, ITNA, August 31, 2014, Accessed: November 5, 2015, <http://www.itna.ir/vdcesq1.2bqis8laa2.html>

¹⁴⁹ National Information Network Requires an Additional Investment of Over \$4 Billion, Tasnim News, January 25, 2015, Accessed: November 5, 2015, <http://www.tasnimnews.com/Home/Single/632249>

¹⁵⁰ Private Sector Investment in National Information Network Project, Mehrnews, February 4, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2485665/اطلاعات-خصوصی-در-شبکه-ملی-اطلاعات-%>

¹⁵¹ Allocation of \$333.3 Million to National Internet Project, Mehrnews, May 3, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2566650/هز-از-میلیاردی-برای-اینترنت-ملی-۵-هز-%>

¹⁵² Budget Cut in National Information Network Due to ICT Ministry Lack of Interest, Mehrnews, January 5, 2015, Accessed: November 5, 2015, <http://www.mehrnews.com/news/2473317/کاهش-بودجه-شبکه-ملی-اطلاعات-به-دلیل-عدم-است-۲۴۷۳۳۱۷-%>

¹⁵³ Ibid.

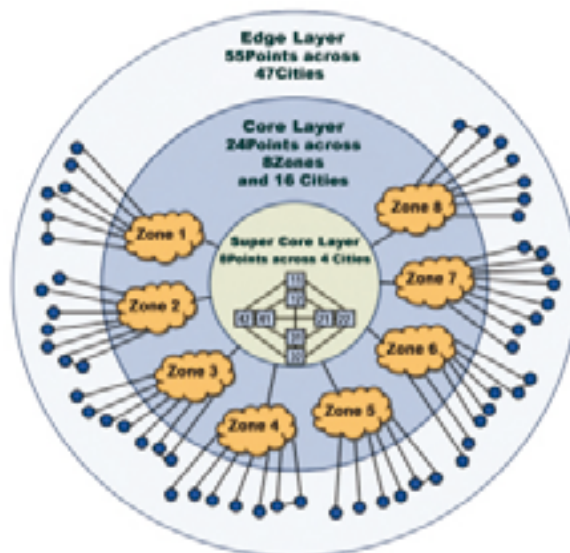
IP network

Iran's Internet operates on a set of provincial IP/MPLS¹⁵⁴ networks.¹⁵⁵ The provincial networks are composed of a number of interconnected Metro Ethernet. The Metro Ethernet are connected to each other through the provincial Core Layer. Ultimately, they will be connected to the national network. The provincial core layer points of presence (PoP) can be considered the "edges" of the national network. The PoPs usually use IP/MPLS switches to connect to the national IP/MPLS core. They also make use of concentrated Broadband Remote Access Server (BRAS) equipment for client management.

Iran's IP/MPLS network is composed of four constituent parts: the Super Core Layer, the Core/Edge Layer, the Metro Ethernet Layer, and an Access Network. The Super Core Layer, accounting for the central structure of the high-speed network, is composed of 8 points spread across the cities Tehran, Mashhad, Tabriz and Shiraz. This layer is responsible for connection to international networks and interconnections between different providers (IXs¹⁵⁶). The Core/Edge Layer includes one or more national networks with almost 80 IP/MPLS-based points. This layer is responsible for the transfer of national and international traffic through the Super Core Layer. It is divided into two echelons: an internal core level with 24 switches (known as P switches), and external core level with 55 switches (known as PE switches). The P and PE switches cover all provincial capitals. Two or three PoPs are used to connect each provincial network to the National Internet. This layer also transfers national traffic between provinces and provides VPN/MPLS services. The Metro

Ethernet Layer is responsible for accumulating traffic of the access networks, transferring the traffic through the Edge Layer and providing Urban Ethernet and VPN services. Lastly, the Access Network provides services to end users. The network is built upon technologies such as WiFi, DSL, fiber optics and cellular services.

Layers of Iran's IM/MPLS Network



¹⁵⁴ Multiprotocol Label Switching (MPLS) is a mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.

¹⁵⁵ See: <http://matma.ir/documents/10180/922599/ITO- National information network traffic forecast-3-Principles of Forecasting-1390-RW02.pdf>

¹⁵⁶ Internet exchange point (IX or IXP) is a physical infrastructure through which Internet service providers (ISPs) and Content Delivery Networks (CDNs) exchange Internet traffic between their networks (autonomous systems)

Iran's dominant version of Internet Protocol in use is, currently version 4 (IPv4). In February 2015, the chairman of Information Technology Company stated that there are over 10 million IPv4 protocols deployed in the country.¹⁵⁷ Nonetheless, the national government has recently provided the Information and Communication Technologies (ICT) firm additional resources to implement Internet Protocol version 6 (IPv6). Reza Taghipour, Minister of Communications in Ahmadinejad's administration, declared, "the national information network would be based on IPv6". Likewise, current Minister of Communications Mahmoud Vaezi spoke about the necessity of upgrading to IPv6. In 2011, the Administrative Committee on Migration to IPv6 and the Task Force on Migration to IPv6 compiled a document which described the operationalization and scope of the project.¹⁵⁸ Evidently Iran is determined to fill this technological gap and equip itself with all necessary requirements to sustain a fast and reliable Internet. The main advantage of IPv6 over IPv4 involves its larger address space. The length of an IPv6 address is 128 bits, as compared with 32 bits in IPv4. In addition, the IPv4 address space is poorly allocated, with approximately 14%, of all available addresses utilized as of 2014.¹⁵⁹ Transition to an IPv6 standard would bring Iranian Internet infrastructure in line with the currently accepted global standards, as well as provide a means in which further expansion and proper allocation of addresses could be undertaken with the greatest possible efficiency.

On May 29, 2015, the secretariat of the High Council of Information Technology approved a decree mandating, "all administrative organizations are obliged to migrate from IPv4 to IPv6."¹⁶⁰ According to the approval, all domestic vendors were required to support both protocols in their products. It should be noted that IPv4 and IPv6 are not directly compatible, but IPv6 devices are built using a process called dual stack that allows IPv6 and IPv4 to run simultaneously alongside each other. In addition, the Iranian Customs Administration, under the supervision of the Communications Regulatory Authority, was obliged to clear software and hardware equipment required for implementing the upgrade. Based on a report¹⁶¹ published by the Ministry of Information and Communications Technology, IP bandwidth capacity in Iran was at 450,000 E1¹⁶² in summer 2013, 650,000 E1 in spring 2014, and 1,350,000 E1 in spring 2015. Furthermore, Iran launched the "Tadbir 1" project in order to enhance IP capacity. The project established a declared objective to increase "Internet bandwidth to 4 Tbps and to develop a domestic IP network with a capacity of over 20Tbps". According to officials in the Telecommunication Infrastructure Company, Tadbir 1 will become operational by March 2016.¹⁶³

The Telecommunication Company of Iran is also in the process of implementing the "Next Generation Network" (NGN). NGN is a multi-service IP network with a unified

¹⁵⁷ Warning on Transition to IPv6 Protocol, ISNA, February 4, 2015, Accessed: November 27, 2015, <http://isna.ir/fa/print/93111508346/هشدار-برای-گذر-به-نسخه-جدید-آی-پی-اینترنت/>

¹⁵⁸ See Operational Framework for Migration of IPv4 to IPv6 at: <http://matma.ir/documents/10180/922599/ITO- National information network traffic forecast-3-Principles of Forecasting-1390-RW02.pdf>

¹⁵⁹ For more information, please visit: <http://www.cnet.com/news/moving-to-ipv6-now-for-the-hard-part-faq/>

¹⁶⁰ Directive on Migration of IPv4 to IPv6, ICT Ministry, July 12, 2015, Accessed: November 27, 2015, http://www.iranipv6.ir/images/pdf_seminar/mosavabe-ipv4beip6.pdf

¹⁶¹ TALASH Project is Launched, ICT Ministry, June 30, 2015, Accessed: November 27, 2015, <https://www.itrc.ac.ir/news/پروژه-توسعه-لایه-انتقال-شبکه-زیرساخت-کشور-پر>

¹⁶² The European Conference of Postal and Telecommunications Administrations (CEPT) originally standardized the E-carrier system, which revised and improved the earlier American T-carrier technology, and this has now been adopted by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T). The E1 signal format carries data at a rate of 2.048 million bits per second and can carry 32 channels of 64 Kbps each

¹⁶³ TADBIR Project to Become Operationalized, IRNA, April 21, 2015, Accessed: November 27, 2015, <http://www.irna.ir/fa/News/81579003/>

management and control structure, integrating the public switched telephone network (PSTN) for wireless mobile communications, the public switched data network (PSDN), as well as the Intelligent Network (IN) in a packet-based public structure. According to a report by the Washington Post, the United States has 1.6 billion IP addresses, allowing each citizen to have up to five distinct Internet connections.¹⁶⁴ However, Iran has less than 11 million IP addresses, which means only one address for every seven citizens. This number limits Iranians' ability to communicate online. The Washington Post also reports that Iran has purchased one million IP addresses over the 15-month period leading to the article's publication. Iran paid 10 USD for each IP address. "Purchase of IP addresses means that they [the Iranian authorities] want to be present in the Internet; It is a positive sign that they are trying to expand their relations," Philippa Gale, professor of computer sciences at the Stony Brook University was quoted as saying.

Reza Taghipour, Minister of Communications in Ahmadinejad's administration, had stated that "the national information network would have to be based on IPv6". Likewise, current Minister of Communications Mahmoud Vaezi has spoken about the necessity of utilizing IPv6. Iran has tried over the past few months to convince public and governmental organizations to use this new protocol. Progress, however, has been slow. The national government

has arranged meetings with ICANN¹⁶⁵ to make advancements in this field. In addition, the Institute for Research in Fundamental Sciences recently hosted a local seminar with the presence of major RIPE NCC managers to address potential avenues for advancement in this area.¹⁶⁷

Iran currently possesses 10 million active IPv4s. The country needs almost four times this number of IPs to be able to develop its infrastructures and provide services through the national information network. The infrastructural network should replace old equipment with new equipment that can support IPv6, but the associated costs for such an extensive project have not been announced. Recent reports indicate a huge demand for new IP addresses in Iran.¹⁶⁸ Telecommunication companies have already bought over one million IPs in 2006, 81 percent of which were purchased from the Romanian company, Jumpo.ro.¹⁶⁹

Despite the technical challenges faced, the project of moving from IPv4 to IPv6 is under way, with some progress being made towards the stated end goals. Although a detailed budget has not yet been announced, the managing director of the Information Technology Company stated in September 2009 that the company has requested some 10 million USD to "move to IPv6 and manage Internet resources accordingly."¹⁷⁰

¹⁶⁴ Timberg, Craig, Tech Investments Show an Iran Eager to End Isolation, The Washington Post, April 6, 2015, Accessed: November 27, 2015, http://www.washingtonpost.com/business/technology/iran-positions-itself-to-be-a-tech-leader-in-turbulent-middle-east/2015/04/06/e52ad4ea-d948-11e4-8103-fa84725dbf9d_story.html

¹⁶⁵ The Internet Corporation for Assigned Names and Numbers (ICANN) is a nonprofit organization that is responsible for coordinating the maintenance and methodologies of several databases, with unique identifiers, related to the namespaces of the Internet - and thereby, ensuring the network's stable and secure operation

¹⁶⁶ Réseaux IP Européens (RIPE, French for "European IP Networks") is a forum open to all parties with an interest in the technical development of the Internet. The RIPE community's objective is to ensure that the administrative and technical coordination necessary to maintain and develop the Internet continues. It is not a standards body like the Internet Engineering Task Force (IETF) and does not deal with domain names like ICANN.

¹⁶⁷ Regional RIPE Conference in Tehran, Iran IPV6, November 19, 2014, Accessed: November 27, 2015, <http://www.iranipv6.ir/fa/news/181-ipv6>

¹⁶⁸ Report on Demand for Migrating to IPv6, Iran IPV6, November 19, 2014, Accessed: November 27, 2015, http://www.iranipv6.ir/images/pdf_seminar/ipv4_address_market-v2.pdf

¹⁶⁹ Ibid.

¹⁷⁰ IT Projects on Halt Due to Budget Cut, DPI, August 25, 2009, Accessed: November 27, 2015, <http://www.dpi.ir/fa/news/2930/ای-تی-کمیونیدو بودجه متوقف سطر ح-های>

Appendix 2: Domestic Datacentres

There has recently been a concerted movement towards the hosting of popular and government-affiliated websites on the servers of private domestic servers in Iran. According to the most recent statistics published¹⁷¹ by the Ministry of Information and Communications Technology (published on September 7, 2015), 40 percent of Iran's Internet traffic is currently circulating inside the country. By association, it can be concluded that 40 percent of the content visited by Iranian users is hosted internally. By contrast, the Fifth Development Plan of the Islamic Republic of Iran stipulates¹⁷² that 80 percent of the traffic should be hosted internally and the rest allocated to international hosts. Such a goal, however, falls below the Islamic government's ultimate goal, which seeks to double this rate of domestic injection. According to the Fifth Development Plan of the Islamic Republic of Iran, 80 percent of Iranian Internet traffic should be hosted internally, with the rest allocated to international hosts.

In 1999, an organization affiliated with the Ministry of Information and Communications Technology named "The Data Company" (currently known as the Information Technology Company, or ITC), established the National Information Sharing Network (NISN-2) in Imam Khomeini Square in Tehran. NISN-2 was launched to provide different companies and institutions with Internet hosting services. NISN-2 also served the secondary purpose of forming an integrated national network for Iranian websites. This was the second attempt at establishing a national information-sharing network, following work on the NISN-1, a network designed according to the X.25 protocol.¹⁷³

By switching to Internet Protocol (IP), NISN-2 was released, costing over 400,000 USD and largely serving to "prevent leakage of national information and reduce expenses on international bandwidth."¹⁷⁴ With the cooperation of an international information technology company,¹⁷⁵ a contract was signed with Petsa Co. in 2002, stipulating the delivery of required software and hardware, which were to be imported later in the same year.¹⁷⁶ Email software was purchased from the American company, Open Wide, and a search engine was provided through Altavista. However, the project did not formally start work until December 2005.¹⁷⁷

In March 2006, a few months after the start of the project, it was announced that due to insufficient hosting capacity, NISN-2 would only be capable of providing services to a limited number of government websites. As a result, work on the national datacenter was halted for several years, with the project going into hibernation. Speaking of the status of the scheme, then-chairman of Iran's Telecommunications Research Center,¹⁷⁸ Mohammadreza Sadri stated that the equipment purchased was at least "five years old", leading to rampant inefficiency and obsolescence at the point of inception.¹⁷⁹ This suggests that the effort to establish a National Internet was met with severe technical and organizational problems from the onset.

Reflecting this view, executives in NISN-2 implied that the national datacenter was always aimed to be a political-security issue, rather than a technological and economic one.¹⁸⁰ As one executive stated: "one of the objectives of NISN-2 was to

¹⁷¹ Rumors around National Information Network are Incorrect, Khabaronline, August 25, 2015, Accessed: February 1, 2016, <http://www.khabaronline.ir/detail/450415/ict/ict>

¹⁷² Full text of The Fifth Development Plan of Islamic Republic of Iran: <http://ictb.ir/index.php/1389-12-02-12-27-38>

¹⁷³ X.25 is an ITU-T standard protocol suite for packet switched wide area network (WAN) communication

¹⁷⁴ NISN 2 Launch of Hosting Services, ISNA, May 8, 2006, Accessed: November 27, 2015, <http://www.hamvatansalam.com/news59857.html>

¹⁷⁵ The name of this company is not known.

¹⁷⁶ Why the National Datacenter is not Operationalized, ICTNA, February 22, 2005, Accessed: November 27, 2015, <http://www.ictna.ir/report/archives/000493.html>

¹⁷⁷

¹⁷⁸ ITRC is currently known as Information and Communication Technology Research Center

¹⁷⁹ Shafiei, Hamed, National Datacenter Project Still in Coma, ITIRAN, January 14, 2009, Accessed: November 27, 2015, <http://itiran.com/d/54604>

¹⁸⁰ Status of National Datacenter, ISNA, February 22, 2005, Accessed: November 27, 2015, <http://isna.ir/fa/print/8312-09325.29370/-چرا-ادیتلسنتر-از-طرح-ملمی-شارح-2-چرا-ادیتلسنتر->

become independent from international services, in order to be able to manage servers during periods of political unrest.” An example of such a situation emerged in 2006 and 2009 in Jask and Fujairah, when fiber optic lines were cut off and national websites, including certain government sites, were interrupted. Iranian officials have frequently raised this issue highlighting the costs associated with each disruption and have emphasized on alternative solutions to address the issue. Damages to fiber optics are reported by multiple sources citing various views including suspicions in disruptions.¹⁸¹

In 2009, work on the national datacenter project was resumed by another organization affiliated with the Ministry of Information and Communications Technology, this time the Telecommunication Infrastructure Company. According to national law, Telecommunication Infrastructure Company is the exclusive provider of bandwidth in Iran. Since the datacenter hosted sensitive governmental information, the government issued a decree approving Isiran and Zaeim,¹⁸² subsidiary companies of security and military foundations, allowing them to take on the project without offering a bidding price. Zaeim is a subsidiary company of the Islamic Revolutionary Guard Corps (IRGC),¹⁸³ and Isiran¹⁸⁴ is affiliated with the Ministry of Defense and Armed Forces Logistics.¹⁸⁵

The national datacenter was supposed to store all data available in the country as well as host all national websites.¹⁸⁶ Another objective of the datacenter was to keep a backup of national data for emergencies, preventing massive

data loss and the shutdown of vital governmental organizations and ministries. Five months later in 2009, 10 million USD were allocated to complete the national datacenter in just one year.¹⁸⁷ However, due to severe bureaucratic backlog, only the orders to commence work on the project were issued. In November 2010, Telecommunication Infrastructure Company, as the employer, issued official notifications¹⁸⁸ to the two contractor companies.

In September 2012, the project stopped again, for two reasons. First, proper construction permits were not obtained from the municipality of Tehran, and second, the cost of the project exceeded the projections laid out in the contract. In the same period, Zaeim Co. built Iran's biggest datacenter for the third national mobile service provider, Rightel,¹⁸⁹ in only eight months. This project was three times the size of the national datacenter. While official statistics are not available on the level of investments on the Rightel datacenter, the incident highlighted the negative role of bureaucracy in national and governmental projects, as well as the inappropriate budgeting procedures the government employs in advancing such endeavors.

After the failure of the NISN-2 project, Information Technology Company launched the first provincial datacenter in Khuzestan in 2012.¹⁹⁰ This seemed to mark a shift in focus from the initial plan to develop dedicated data centers for a National Internet project, suggesting a certain level of discontinuity in the bureaucratic management and

¹⁸¹ For more information, please see: <http://www.engadget.com/2008/02/05/fourth-undersea-cable-cut-near-uae-suspicious-rise/> and https://web.archive.org/web/20080207031404/http://www.renexus.com/blog/2008/02/attention_iran_is_not_disconne_1.shtml and <http://www.globalresearch.ca/three-Internet-cables-slashed-in-a-week-has-iran-lost-all-Internet-connectivity/7987>

¹⁸² Website available here: <http://www.epicos.com/EPCompanyProfileWeb/GeneralInformation.aspx?id=22877>

¹⁸³ For more information about this connection, please visit: <http://dw.com/p/131M4>

¹⁸⁴ More information available here: <http://www.iranwatch.org/iranian-entities/information-systems-iran-isiran>

¹⁸⁵ Ibid. and <http://goo.gl/wa2PF6>

¹⁸⁶ Allocation of \$30 Million to National Datacenter Project, Medianews, April 17, 2010, Accessed: November 27, 2015, <http://www.medianews.ir/fa/2010/04/17/datacenter.html>

¹⁸⁷ Building the Biggest National Datacenter for the Third Operator, Farsnews, September 24, 2012, Accessed: November 27, 2015, <http://goo.gl/4KmOXW>

¹⁸⁸ Ibid.

¹⁸⁹ Website available at: <http://www.rightel.ir/>

¹⁹⁰ First Provisional Datacenter Operationalized in Khuzestan, Farsnews, February 18, 2013, Accessed: November 27, 2015, <http://www.iritn.com/3-امنیت-و-شبکه-نخستین-دیتاسنتر-استانی-کشور-در-خوزستان-3>

development of the project. Such inconsistencies have become endemic to the larger project, hinting at deep organizational flaws in institutional design. The main plan was to launch 18 provincial datacenters, which were to be integrated with the national datacenter in a cloud-computing framework.¹⁹¹ The provincial datacenters were intended to “supply specialized servers and hosting services for seminaries and governmental organizations, and provide emailing services for members of seminaries and employees of governmental organizations.”¹⁹² A member of the board of directors of Information Technology Company claimed on June 9, 2015 that “the development of 19 datacenters, 18 provincial and one national, has started with an initial budget of 23 million USD. Seven datacenters are currently operational.”¹⁹³

Recently, Saber Feizi, former chairman of Telecommunication Company of Iran, criticized the provincial datacenter project, stating, “all they have done is develop a few isolated datacenters. The main idea behind the national information network, as proposed by a former minister in the Ahmadinejad administration, was brilliant. However, the minister had insufficient operational means to complete the project.”¹⁹⁴ This view further supports the perceived incongruence in planning hinted at earlier.

While he spoke of insufficient operational means, incidents such as the failure of the Zaeim-Isiran contract and the relative successes of the Rightel datacenter point to one potential cause of the problem. Clunky bureaucratic overlaps

built into the organizational structure of the Ministry of Information and Communications Technology, inappropriate financial plans, and insufficient coordination between related organizations are the main obstacles hindering the development of the national datacenter. Resolution of such issues seems unlikely in the short term.

Finally, Telecommunication Infrastructure Company, the lead organization assigned with the implementation of and equipped with an allocated budget of 10 million USD, stated in August 2014 that it had already used up 7 million USD of the budget to launch a datacenter, though not a “national” one, with a bandwidth of 30 Gbps.¹⁹⁵ One year later, thanks to the implementation of a new government approach¹⁹⁶ for assigning datacenter development contracts to the private sector, the Communication Regulatory Commission (also known as the Institution of Regulating and Regulatory Arbitration for Establishment of a Competitive Environment in Investment and Operation and Empowerment of Non-Governmental Competitors) passed a regulation prohibiting the provision of datacenter-related services by Telecommunication Infrastructure Company as such services, according to this regulation, were not in compliance with Article 44 of the Constitution of the Islamic Republic of Iran (calling for the development of privatization efforts).¹⁹⁷ Eventually, the government resolution passed in July 2015, “authorizing the implementation and management of domestic datacenters by the private sector”, putting an end to the creation of national-governmental datacenters.¹⁹⁸ It is worth mentioning that the national datacenter currently

¹⁹¹ Cloud computing, also known as on-demand computing, is a kind of Internet-based computing, where shared resources and information are provided to computers and other devices on-demand

¹⁹² Nine Datacenters Operationalized in the 10th Republic, Farsnews, July 7, 2013, Accessed: November 27, 2015, <http://www.farsnews.com/newstext.php?nn=13920416000369>

¹⁹³ Ibid.

¹⁹⁴ ICT Ministry Train on Development Track, Khabaronline, August 4, 2015, Accessed: November 27, 2015, [http://khabaronline.ir/\(X\(1\)S\(jmagziventhywuzqw4g3nhj\)\)/detail/442976/root/ict](http://khabaronline.ir/(X(1)S(jmagziventhywuzqw4g3nhj))/detail/442976/root/ict)

¹⁹⁵ Maintaining 20% of Internet Traffic Nationally, Mehrnews, August 9, 2014, Accessed: November 27, 2015, <http://www.mehrnews.com/news/2346208/30-گیگابیت-امکان-میز-بانی> و شبکه/نخستین-دیتاسنتر-استانی--آ.ا.نگهداری-20-در-صدر-تر-افیک-اینتر-نت-در-داخل-کشور-امکان-میز-بانی-30-گیگابیت

¹⁹⁶ Datacenters Given to Private Contractors, Students News Agency, February 5, 2015, Accessed: November 27, 2015, <http://snn.ir/detail/News/387241/169>

¹⁹⁷ Prohibition of Service Provision by Telecommunication Infrastructure Company to Datacenters, Mehrnews, June 24, 2014, Accessed: November 27, 2015, <http://www.mehrnews.com/news/2786431/ارائه-خدمات-دیتاسنتر-توسط-شرکت-زیر-ساخت-غیر-مجاز-اعلام-شد>

¹⁹⁸ Government Offers Servers Free of Charge, YJC, June 27, 2015, Accessed: November 27, 2015, <http://www.yjc.ir/fa/news/5244798/دولت-سرور-رایگان-می-دهد>

hosts only one website which deals with subscription to and disbursement of subsidies.¹⁹⁹

The decision was made as a result of the failures of both the Telecommunication Infrastructure Company (the organization responsible for the national datacenter) and Information Technology Company (the organization in charge of NISN-2 and the provincial datacenters). Over a period of several years, the two public organizations failed to properly complete datacenter projects as defined by the government mandates procuring such ventures. In addition, such projects may have been in violation of Article 44 from the onset, rendering the legal basis of their implementation untenable.

Over the past years, the private and semi-private sectors have also attempted to develop datacenters in Iran. In May 2005, the Ministry of Information and Communications Technology authorized three companies (Pars Online,²⁰⁰ Dadeh Pardazi Iran²⁰¹ and Dadeh Samaneh Fanava) to establish datacenters with similar mandates as those dictated earlier. Three months later, on August 2, 2005, the private sector developed its first datacenter to enter the National Internet project. However, private companies continue to face many problems such as lack of governmental support, emergence of state-run competitors, high bandwidth costs, Internet disconnections, late returns on investment, lack of required communication infrastructures, lack of trust among customers, and high total costs. However, despite these barriers to entry, companies within the private sector in Iran have had some successes in providing services for hosting and storing information. In addition to the three companies mentioned above, many other companies are beginning to provide public and private websites with hosting services.²⁰²

Such barriers, including the technical and bureaucratic challenges outlined, bring into question the overall purpose and effectiveness of the national datacenter project. Overall, in terms of quality of service, domestic hosting has only one advantage, which can be provided only to users inside Iran, and not those attempting to access Iranian content abroad. Domestic datacenters can ensure that Iranian users will be provided with faster access to websites that are being hosted domestically. On the other hand, major drawbacks of domestic hosting include high costs of renting domestic servers in Iran, lower levels of security for domestic servers, slow access for users outside Iran, and lower rankings for domestic websites due to the slower speed at which these websites are loaded by the bots employed in foreign search engines such as Google and Yahoo.²⁰³

Similar issues can be raised regarding the quantitative differences between national and international web hosting. Most notable are differences in prices between domestic and foreign hosting services. Examining differences between these alternatives, we find that foreign providers²⁰⁴ offer a price²⁰⁵ that is at least five times cheaper compared to the price offered by an Iranian server.

Although official statistics for 2010 (provided under the Ahmadinejad administration) indicated that between 70% - 90% of public websites were hosted domestically, the Supreme Council of Cyberspace under President Rouhani stated that the number of the websites hosted domestically amounted to 40%.²⁰⁶ In more recent statistics issued in September 2015, the Minister of Telecommunications, Mahmoud Vaezi stated that “currently 40 percent [of the content] is hosted domestically and 60 percent is hosted by foreign providers.”²⁰⁷

¹⁹⁹ Please see: <http://goo.gl/3b4wdX> and <http://www.refahi.ir/>

²⁰⁰ Website available at: <http://www.parsonline.com/>

²⁰¹ Website available at: <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=32315951>

²⁰² Detailed list of such companies can be found in figure one.

²⁰³ For more information, please visit: <http://www.entrepreneurs-journey.com/550/how-to-boost-your-alex-rank-in-one-easy-step/>

²⁰⁴ For details please visit: <http://my.mihanwebhost.com/announcements.php?id=144>

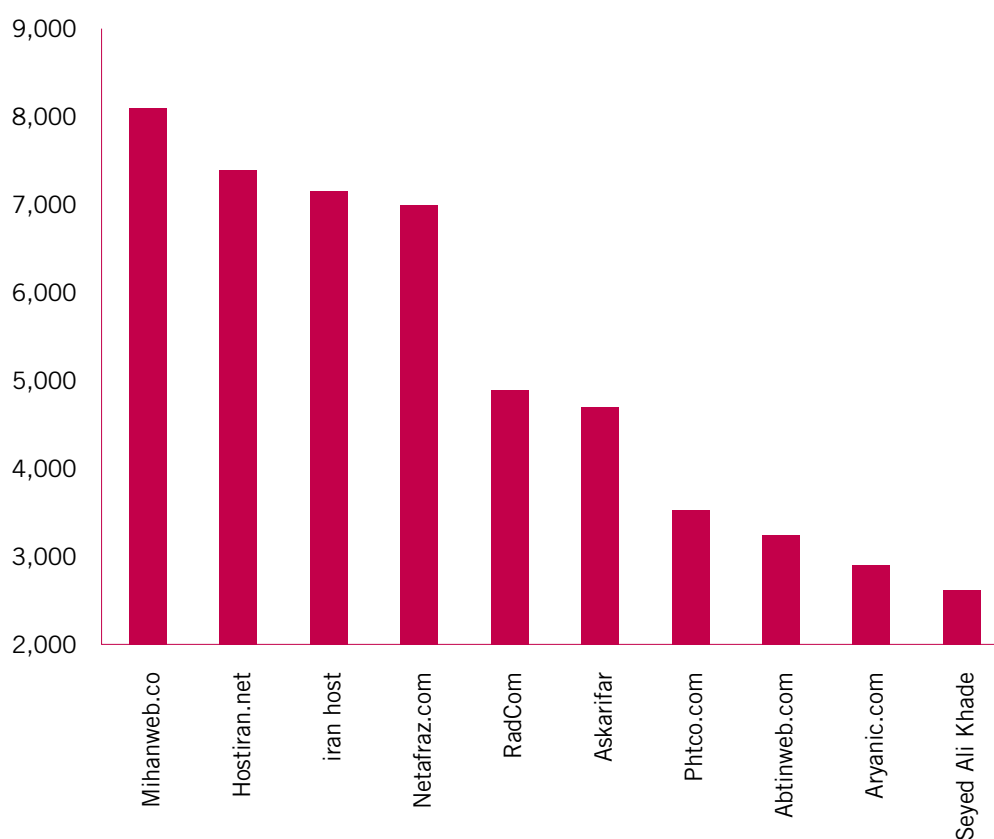
²⁰⁵ For details please visit: <http://my.mihanwebhost.com/announcements.php?id=83>

²⁰⁶ Why 40% of Governmental Domains Hosted Abroad, Khabaronline, March 14, 2014, Accessed: February 1, 2016, <http://www.khabaronline.ir/detail/344228/ict/5078>

²⁰⁷ Rumors around National Information Network are Incorrect, Khabaronline, August 25, 2015, Accessed: February 1, 2016, <http://www.khabaronline.ir/detail/450415/ict/ict>

Appendix 3: Top Hosting Service Providers

Largest Web Hosting companies in Iran



Largest Web Hosting companies in Iran and the number of their total hosted domains according to WebHosting.Info [<http://www.webhosting.info/web-hosting/reports/country/IRN>]

Data accessed in September 2015

Appendix 4: Authorities in charge of the Internet

a. Telecommunication Infrastructure Company

The Telecommunication Infrastructure Company, a subdivision of the Ministry of Information and Communications Technology, is involved in provision of telecommunication infrastructures in Iran. As the company in charge of the main telecommunication network in Iran and as the agent of the Ministry of Information and Communications Technology, this company is responsible for implementing switching and telecommunication systems for operators at points of presence and related networks. The company also maintains the exclusive right to purchase and assign bandwidth.

b. The Communications Regulatory Authority

Established in 2003, the Communications Regulatory Authority is an independent regulator and monitoring authority, which attempts to create a competitive environment in telecommunication service market and to improve the quality of these services.²⁰⁸ It is authorized to issue permits/licenses for operations and applications used in telecommunication and postal services, support owners of industries, associations, and societies of telecommunication service providers, and regulate and continuously oversee frequencies within the system. This authority is also responsible for managing deregulation and the privatization of postal and telecommunication services.

c. Telecommunication Company of Iran

TCI²⁰⁹ is a long-established publicly traded company incorporated in 1971 with an initial capital of over IRR 5 billion. With 30 branches in different provinces, TCI owns the Mobile Telecommunication Company of Iran. Its operations are mainly focused on launching and operating telecommunication networks and any activities related to communication and information technology, except for basic networks. In December 2009, in the largest transfer in the history of the Iranian stock exchange, 50+1% of shares in TCI were acquired for 2,6 billion USD by Tose'e Etemad Mobin Consortium (a consortium consisting of three companies: Gostaresh Electronic Mobin Iran and Shahryar Mahestan, owned by the Revolutionary Guard's Cooperative Foundation, and Tose'e Etemad Investment Company).²¹⁰

d. Internet National Development Management Center

Internet National Development Management Center (INDMC)²¹¹ is a subdivision of Information Technology Company at the Iranian Ministry of Information and Communications Technology that presents statistics on speed tests for Internet service providers, ranks these providers, and carries out projects related to the National Internet. INDMC's objectives include management and assignment of Internet addresses, development of the national cyberspace, development of dot.ir websites, and enforcement of relevant policies for registering and assigning IP6 and IP4 addresses. The national browser (SAINA) was developed by INDMC.

²⁰⁸ Website available at: <http://cra.ir/>

²⁰⁹ Website available at: <http://tci.ir/>

²¹⁰ History of Privatization of Telecommunication Company of Iran, Fararu, April 7, 2010, Accessed: November 27, 2015, <http://fararu.com/fa/news/44452>

²¹¹ Website available at: <http://matma.ir/>

e. Legislative Authorities in Charge of the Internet:

Founded in March 7, 2012 pursuant to a decree by the Supreme Leader, the Supreme Council of Cyberspace²¹² is responsible for launching the National Cyberspace Center. On September 5, 2015, the Supreme Leader of the Islamic Republic of Iran issued a decree which called for speeding up the process of launching the national information network, while designating new members of SCC and dissolving other entities with similar functions.²¹³ The new composition of natural persons and legal entities in SCC and their affiliations with conservative authorities can be a cause of concern. The SCC's current legal members are:

- The Chairman of the Iranian Parliament (the Islamic Consultative Assembly)
- The President (the Chair of the High Council)
- The Head of the Judiciary
- The Director of the Islamic Republic of Iran Broadcasting
- The Secretary of the High Council and the Head of Center
- The Attorney General
- The Minister of Information and Communications Technology
- The Minister of Culture and Islamic Guidance
- The Minister of Science, Research & Technology
- The Minister of Intelligence
- The Minister of Education
- The Minister of Defense & Armed Force Logistics
- The Vice President in Science and Technology
- The Chairman of the Cultural Commission at the Islamic Consultative Assembly
- The Director of the Islamic Development Organization
- The Commander in Chief at the Revolutionary Guard
- The Commander of the Iranian Police

They are joined by the following individuals:

- Dr. Seyed Saied Reza Ameli (The vice president of Planning and Information technologies at the University of Tehran)
- Dr. Hamid Shahryari (Head of Statistical and Informatics Center of the Judiciary)
- Dr. Reza Taghipour (former Minister of ICT during Ahmadinejad's Presidency)
- Dr. Mahdi Akhavan Bahabadi (IRIB Deputy Director General in Information Technology and Modern Media Affairs)
- Masoud Abutalebi (Chairman of the Consulting Group to IRIB)
- Dr. Kamyar Saghaphi (Chancellor of Shahed University)
- Dr. Rasul Jalili (Head of International and Scientific Cooperation' Office at Sharif University – Founder of AmnAfzar Gostar e Sharif)
- Seyed Ezatollah Zarghami (IRIB former Director General)

²¹² Website available at: <http://csri.ac.ir/>

²¹³ Appointing New Members of SCC, Khabaronline, September 5, 2015, Accessed: November 27, 2015, <http://www.khabaronline.ir/detail/454081/Politics/5095>

Appendix 5: Military-security Organisations involved in ICT

a. Military-Security Organizations Involved in ICT:

a. The Technical Department of the Ministry of Intelligence:

Only limited information is available about the Technical Department of the Ministry of Intelligence. The Head of this department is a member of a commission designated to develop general guidelines for security of the cyberspace, communication networks, and information exchange.²¹⁴ Given the responsibilities of the Ministry of Intelligence, monitoring the cyberspace is clearly a duty that could be fulfilled by this department. In addition, since the minister and vice ministers are members of commissions that set ICT policies, the role of this ministry in developing policies related to ICT development in Iran should be further investigated.

b. Intelligence Organization of the Army of the Guardians of the Islamic Revolution:

Like the Technical Department, the Intelligence Organization of the Army of the Guardians of the Islamic Revolution has likely played a central role in arresting many Iranian activists by monitoring their online activities. In December 2013, a message appeared on the homepage of Narenji, a website for providing IT-related information in Iran: “For unidentified reasons, a number of contributors and technical staff, namely Ali Asghar Honarmand, Abbas Vahedi, Alireza Vaziri, Nasim Nikmehr, Maliheh Nakhaei, Mohammad Hossein Musazadeh, and Sara Sajadpur were arrested by the Revolutionary Guard.” On December 18, 2013, the Revolutionary Guard enforced its plan for arresting a number of other cyberspace activists.²¹⁵

c. Iranian Cyber Army:²¹⁶

The following report provides a coherent account of the Cyber Army's practices.²¹⁷ “In late 2009, evidence of the Stuxnet virus began to surface in Iranian nuclear facilities. Perhaps Iran and the Islamic Revolutionary Guard Corps (IRGC) witnessed the effects of the newest form of international espionage and warfare, and realized they needed to become a player in the game.” Enter the Cyber Army. Mojtaba Zonnur, then the Supreme Leader's Representative in the Army of the Guardians, had implicitly confirmed that the Iranian Cyber Army was affiliated with the Islamic Republic of Iran.²¹⁸ One of the most official statements on this topic was made by a commander of the Army of the Guard and published by an affiliated news agency, Fars News: “The Army of Guardians has established a cyber army which is the second largest of its kind throughout the world”, said Commander of Qom's Ali Ibn Abi Taleb group.²¹⁹

²¹⁴ Available at the Expediency Council Website, Accessed: November 27, 2015, <http://maslahat.ir/Commissions/Social/DocLib/اعضای هیات علمی کمیته سیاست های کلی/افتا.aspx>

²¹⁵ Arrest of Two Cyber Activists in Shahrivar, International Campaign for Human Rights in Iran, December 18, 2013, Accessed: November 27, 2015, <http://persian.iranhumanrights.org/1392/09/sotoudeh-tahmasebi/>

²¹⁶ Iran Cyber Army Belongs to IRGC, Farsnews, May 3, 2009, Accessed: November 27, 2015, <http://www.farsnews.com/newstext.php?nn=8802130463>

²¹⁷ Lukich, Alex, The Iranian Cyber Army, CSIS, July 12, 2011, Accessed: November 27, 2015, <http://csis.org/blog/iranian-cyber-army>

²¹⁸ An Iranian Official Hesitant About IRGC Cyber Army, BBC Persian, September 6, 2011, Accessed: November 27, 2015, http://www.bbc.com/persian/iran/2011/09/110906_i39_mehdi-sarami_iran_cyber_armi.shtml

²¹⁹ IRGC Backed Cyber Army is the Second Largest in the World, Farsnews, May 20, 2010, Accessed: November 27, 2015, <http://www.farsnews.com/newstext.php?nn=8902300353>

d. The Iranian Cyber Police (FATA):²²⁰

The Iranian Police of Cyber Content and Information Exchange, also known as the Iranian Cyber Police or FATA, is a specialized unit of the Iranian police which is responsible for counteracting phishing (Internet fraud), counterfeiting, theft, hacking, infiltration, organized cybercrime, pornography, and violations of privacy. FATA was established on January 23, 2011 upon an order issued by Esmail Ahmadi Moghaddam, then the Commander of the Iranian Police. According to the Chief of the Cyber Police, the Iranian Cyber police is responsible for maintaining order, security, and public and individual safety in cyberspace.²²¹ However, their record of actions paints a far starker picture. Sattar Beheshti, an Iranian blogger arrested by FATA, died of torture on October 30, 2012 while in detention.²¹² Earlier, the International Campaign for Human Rights in Iran had reported that a privately-owned company in Iran was under pressure from FATA to disclose a user's personal information.²²³

e. The Organized Crime Investigation Center:

The Organized Crime Investigation Center, an organization affiliated with the Revolutionary Guard Cyber Defense Command, was established in 2007.²²⁴ The center is responsible for monitoring and investigating organized crimes, terrorism, espionage, and economic and social crimes in the cyberspace in collaboration with other intelligence and judiciary organizations to identify threats posed by the worldwide web and other advanced technologies by making use of intelligence and technical capabilities of the Guard's experts and other specialists in accordance with Article 150, the Constitution of the Islamic Republic of Iran, to protect the Islamic Revolution and its achievements.

f. The Committee Charged with Determining Offensive Content :

Established pursuant to Article 22 of the Computer Crimes Law,²²⁵ the Committee Charged with Determining Offensive Content (CCDOC) is responsible for monitoring cyberspace, filtering websites with criminal contents, and responding to public complaints. The workgroup consists of the following members (7 members are also present at the Supreme Council of Cyberspace):

- The Attorney General of Iran (Chair of the Committee)
- Minister of Intelligence or his Representative
- Minister of Culture and Islamic Guidance or his Representative
- Minister of Justice or his Representative
- Minister of Information and Communications Technology or his Representative
- Minister of Science, Research & Technology or his Representative
- Minister of Education or his Representative
- Commander of the Police
- An expert in ITC, elected by the Industries & Mines Commission at the Islamic Consultative Assembly
- A member of Judicial & Legal Commission elected by the Commission and approved by the Islamic Consultative Assembly
- Director of the Islamic Development Organization
- Director of the Islamic Republic of Iran Broadcasting
- A representative of the Secretariat of the Supreme Council of the Cultural Revolution

²²⁰ Website available at: <http://www.cyberpolice.ir/>

²²¹ Crimes Traceable by FATA Police, Cyber Police, October 13, 2012, Accessed: November 27, 2015, <http://www.cyberpolice.ir/news/18261>

²²² Erdbrink, Thomas, Head of Tehran's Cybercrimes Unit Is Fired Over Death of Blogger, The New York Times, December 1, 2012, Accessed: November 27, 2015, http://www.nytimes.com/2012/12/02/world/middleeast/after-death-of-sattar-beheshti-iranian-blogger-head-of-tehrans-cybercrimes-unit-is-fired.html?_r=1

²²³ Illegal Pressure on an ISP to Reveal Identity of Cyber Activist, International Campaign for Human Rights in Iran, May 8, 2014, Accessed: November 27, 2015, <http://persian.iranhumanrights.org/1393/02/bayan-fata/>

²²⁴ More information available at: <http://gerdab.ir/fa/about>

g. The Iranian Passive Defense Organization:

The Iranian Passive Defense Organization was established on October 30, 2003, pursuant to a decree by the Supreme Leader of the Islamic Republic. The organization is responsible for creating non-military infrastructures to counter the attacks made by “enemies” and reduce Iran’s vulnerability. In June 2005, the Head of this organization stated that officials who have access to classified information were not allowed to use smart phones.²²⁶

²²⁵ Available at: <http://Internet.ir/law.html>

Appendix 6: Suppliers of Networking Equipment

Cisco, Huawei and ZTE are the main suppliers of networking equipment (in particular, routers) in Iran. Huawei performs its operations through a business partner, a notable development in recent times.²²⁷ During sanctions, Iran had access to Cisco products through Huawei.²²⁸ A number of Iranian companies also provide products from Cisco, HP, and other manufacturers, for both governmental and non-governmental organizations and institutions. One notable example is the Rayan Andishan Faraz Company, which lists on its website the “provision of HP servers and storage equipment; provision of Cisco active network equipment; and consultation on, design and implementation of Cisco-based computer networks.”²²⁹ Other companies provide HP, EMC, Cisco, Dell-Sonicwall and ArenA products and services to a bevy of important firms under a domestic name.²³⁰ National Iranian Copper Industries Co., Tose'e Ta'avon Bank, Parsian Bank, Khark Petroleum Co., Ground Forces of the IRGC, Iranian National Standards Organization, Khatam-al Anbia Construction Co., Telecommunication Company of Isfahan and North Khorasan, and MAPNA Group are among the main clients of this company.²³¹

With respect to fiber optics, the biggest supplier in the country is Shahid Ghandi Co. in Yazd. There are also a number of companies that import Lancier, Tramco, AFL (subordinate to Fujikura Japan) and Fitel products. The imported products are used in banking, telecommunication, education, and mobile communication areas. This area was affected by the sanctions regime. In February 2014, the United States Department of the Treasury lifted sanctions on personal use of telecommunication and Internet-related products. After that, Iran commenced negotiations with Chinese and European vendors to connect public and governmental foundations to the national information network.²³²

A large number of Iranian companies in the private sector are currently involved in supplying telecommunication equipment at both micro and macro levels. They have been the major suppliers of infrastructural equipment for telecommunication projects. A number of companies involved in the national information network project are among the customers supported by the suppliers listed in the table below:

Suppliers of Telecommunications Equipment:

Company	Service provided
Talie Ertebatat Parsian	Network training and security
Andisheh Negar Pars	Launching datacenters using equipment provided by HP and Cisco
Blue Cut	Datacenter, network, IP services, telecommunication equipment

Currently, 99 companies in Iran are authorized members of the Iranian Telecommunication Industries syndicate.²³³ Their major operations include a comprehensive list of operational and support services along with supply of equipment.

²²⁷ Huawei Opens Its First Official Retail Store, Barsam, January 28, 2013, Accessed: November 5, 2015, <http://goo.gl/RxHRZE>

²²⁸ Stecklow, Steve, Exclusive: Iranian Cell-phone Carrier Obtained Banned U.S. Tech, Reuters, June 4, 2012, Accessed: November 5, <http://www.reuters.com/article/2012/06/04/us-iran-mtn-sanctions-idUSBRE8530S020120604#bUDBVKDITd6oy19F.97>

²²⁹ For more information, please visit: <http://www.raf.ir/en/sales/cisco>

²³⁰ For more information, please visit: <http://www.abrishamrayaneh.com/aboutus.html>

²³¹ Ibid.

²³² Sanction Lift Impact on Iran Telecom Market, Mehrnews, February 19, 2014, Accessed: November 5, <http://www.mehrnews.com/news/2239416> تاثیر لغو تحریم‌ها بر بازار مخابرات مذاکرات مخابرات با اروپا

²³³ For more details, please visit: <http://telecomsyndicate.ir/UserImage/914.pdf>

Appendix 7: Mobile Internet in Iran

A closer look at the cell phone market in Tehran is helpful in providing an analysis of how sanctions have affected the mobile phone sector of the market in Iran. A report published in July 2015 indicated that the iPhone was the best selling brand of cell phone in Iran, followed by LG, Huawei, and Samsung.²³⁴ The first and the second place rankings in cell phone usage belong to iPhones with different specifications. Cell phones produced by Apple (the first and second rows in the table below) cost about four times an LG cell phone.

Cell-Phone Brands by Popularity:

Brand/model	Internal memory (GB)	Camera resolution (imagepixels)	Price (US dollar)
Apple iPhone 6	64	8	900
Apple iPhone 6	16	8	782
LG G3 Beat Dual SIM D724	8	8	194
Huawei Ascend G620S – L01	8	8	144
Samsung Galaxy S3	16	8	227
LG G3	32	13	447
LG L Bello	8	8	154
Samsung Galaxy Note 4 N910H	32	16	567
Samsung Galaxy S5 SM-G900H	16	16	444
HTC Desire 626G Plus	8	13	214

However, Apple does not yet have an authorized reseller in Iran and the company has issued a statement that denied the existence of any such retailer in the country. A key question then concerns how such a vast number of cell phones have managed to make their way to Iranian consumers' hands and pockets. According to a report by the Islamic Parliamentary Research Center in 2014, only 9 percent of mobile phones imported to and sold in Iran were imported through authorized channels, while 91 percent of phones were smuggled and imported through illegal routes.²³⁵ Over the past few months, following the ratification of a final nuclear deal between Iran and the P5+1, Apple has indicated its intention to launch official businesses and retailers for the thriving Iranian market.²³⁶

The lifting of sanctions has also provided the added advantage of reducing the price of smartphones and data plans.²³⁷ This reduction has been achieved largely through the removal of intermediary brokers, as well as the provision of fixed retail prices. The reduction in prices, however, will not be as considerable as the prices that are currently provided by Iranian online vendors and the online retailer Amazon.

Consider a toy example: currently, the iPhone 6 can be purchased for 890 USD from an Apple auxiliary,²³⁸ whilst companies like DigiKala²³⁹ and Amazon²⁴⁰ provide prices ranging from 872 USD (from the former) and 850 USD (from the latter). It should be noted, however, that issues related to the purchase of genuine (as opposed to knock-off) products has always been an important factor in the Iranian market for mobile phones. This may still produce a notable bump in demand for products from legitimate

²³⁴ Cell-phone Brands by Popularity, Mashreghnews, August 7, 2015, Accessed: November 5, <http://www.mashreghnews.ir/fa/news/450088/پرفروشترین-گوشیهای-موبایل-جدول>

²³⁵ Alerting Statistics on Smuggled Smartphones, Entekhab, May 19, 2014, Accessed: November 5, <http://www.entekhab.ir/fa/news/162300>

²³⁶ Cook, James, Apple is Reportedly in Talks with Iranian Distributors to Start Selling Products There, Business Insider, July 15, 2015, Accessed: November 5, <http://uk.businessinsider.com/apple-in-talks-to-start-selling-products-in-iran-2015-7>

²³⁷ Ahadi, Siamak, Gradual Price Drop of Digital Products Post Sanctions, ZoomIt, February 1, 2014, Accessed: November 5, <http://www.zoomit.ir/it-news/9197-iran-digital-products-price-drop-cancelling-sanctions>

²³⁸ For more details, please visit: <http://www.apple-nic.com/applestore/iphone-shop/آیفون-6-128-گیگ>

²³⁹ For more details, please visit: <http://www.digikala.com/Product/DKP-43063/Apple-iPhone-6-128GB/-6-آیفون-6-128-گیگ>

²⁴⁰ For more details, please visit: http://www.amazon.com/Apple-iPhone-Factory-Unlocked-Smartphone/dp/B00NQQGP6SG/ref=sr_1_1?ie=UTF8&qid=1442164690&sr=8-1&keywords=apple+iphone+6+128gb

retail sources, as consumers may be willing to pay higher prices for genuine products.

Lifting sanctions on Iranian user's access to mobile apps (whether for buying or selling such apps) can also have significant implications.²⁴¹ Recently, Apple removed Iran from its blacklist²⁴² of nations; however, due to the limitations on financial exchanges, it is still impossible for Iranian developers and consumers to buy or sell mobile software on the Apple Store or Google Play.

Mobile Internet

In 2010, the Ministry of Information and Communications Technology issued an exclusive 3G permit for the Third Operator (RighTel). The monopoly ended in August 2014 and Irancell obtained a permit to provide 3G, 4G and all future generations of mobile Internet. Irancell, the First Operator, and RighTel are three companies to provide 2G, 3G and 4G services. The 4G permit, obtained by Irancell and the First Operator, is worth 100 million USD. In order to use 4G technology, users need to upgrade their SIM cards to USIM. Currently, 3G and 4G networks face some barriers related to radio frequency bands. The 700 MHz frequency band is of great strategic importance in many countries. During the Iran-Iraq war, some frequency bands were allocated to the armed forces and the Islamic Republic of Iran Broadcasting (IRIB). Currently, the state TV network broadcasts its analog video content through the 700 MHz frequency band. However, the frequency band, if used by the mobile operators, could potentially reduce costs and expand geographic coverage.

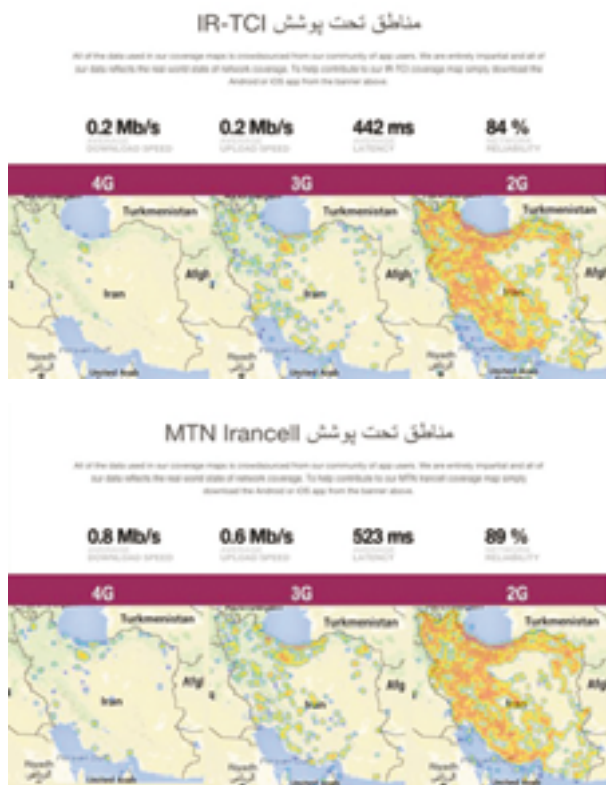
Therefore, negotiations have begun between the Telecommunication Company of Iran and IRIB. IRIB is digitalizing its video content, which, if done, can eliminate the barriers to this move. More than 3.34 billion USD will be required to develop 3G and 4G technologies.

Irancell has thus far invested 5 billion USD for launching 3G and 4G projects and has allocated one billion USD for the development of these technologies in the upcoming years. Similarly, the First Operator has invested 1.34 billion USD for 4G technology. The following figure shows the coverage of the three mobile operators' services.

²⁴¹ Sanction Lift Improves Software Market, Itmen, nd, Accessed: November 5, <http://www.itmen.ir/index.aspx?pid=10307&articleid=28014>

²⁴² See Apple's Global Trade Compliance Page, Apple, nd, Accessed: November 5, <https://www.apple.com/legal/more-resources/gtc.html>

Coverage Map of the Three Mobile Operator²⁴³



²⁴³ Available at: <http://opensignal.com/>

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