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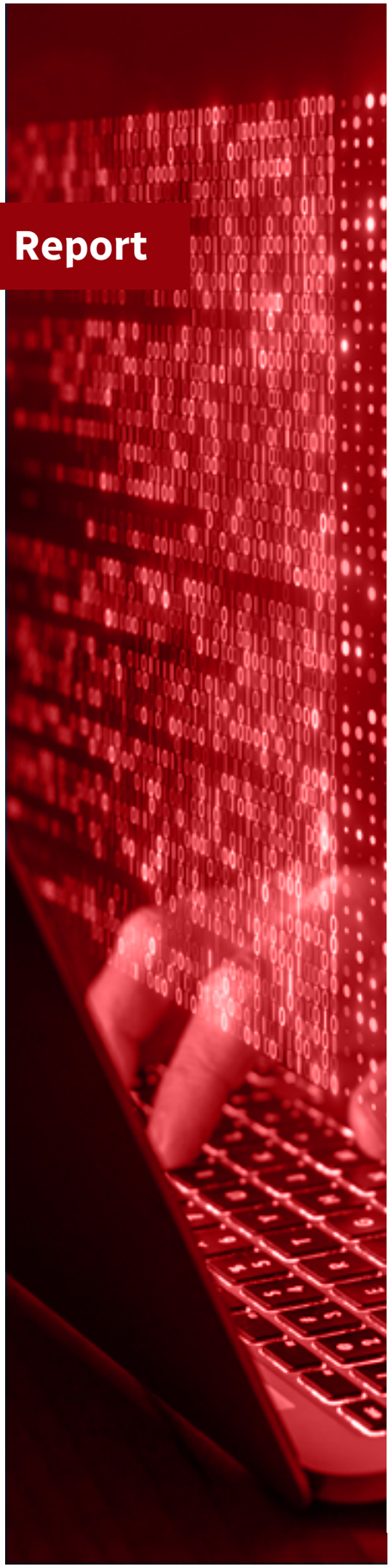

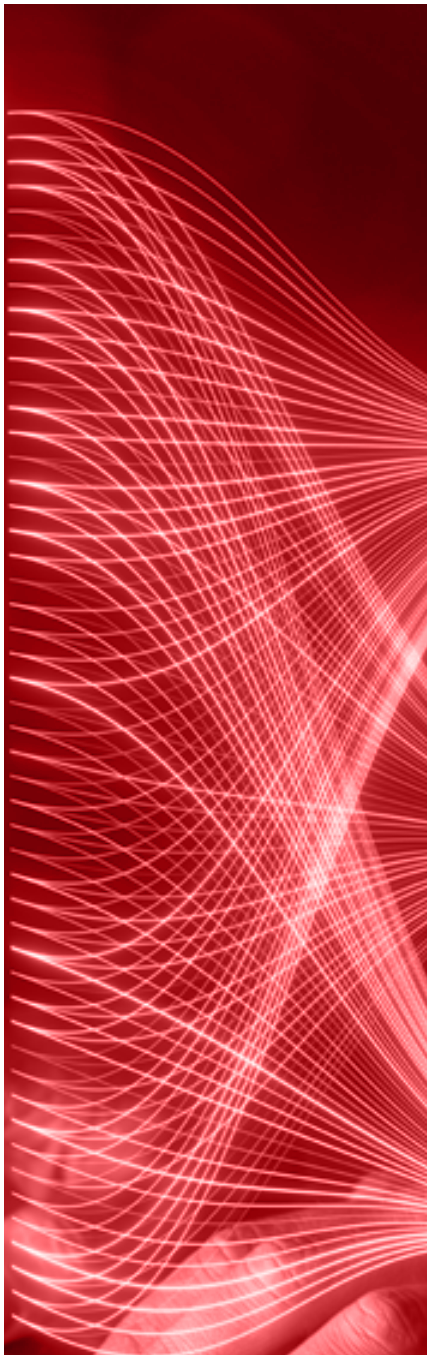

Russia and China in Central Asia's Technology Stack

An analysis of Kazakhstan, Kyrgyzstan and Uzbekistan

Dylan Welch

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Preface

About GMF Technology

The German Marshall Fund of the United States (GMF) Technology Program is dedicated to ensuring that democracies collectively win the strategic technology competition against autocrats. With a transatlantic team based in Washington, D.C., Berlin, Brussels, and Paris, GMF Technology harnesses technical expertise towards three strategic directions: advancing democratic values in Artificial Intelligence (AI) innovation and policy, developing research and analysis to inform the emerging EU-US-China Technology Competition, and enhancing Allied Coordination and Competitiveness in critical and emerging technologies including AI, biotechnology, defense technology and quantum information.

About this Report

This study is part of a research report series by GMF Technology that uses a "technology stack" or "tech stack" framework to assess the technology footprint of the People's Republic of China (PRC) in Europe and Central Asia. The report maps the presence of the PRC and its affiliated entities across countries' technology landscapes. These entities include publicly owned companies, PRC-registered private firms, and other organizations connected to the government and the Communist Party of China (CCP). Building on previous work detailed in two reports by GMF's Alliance for Securing Democracy (ASD) on the future internet and the digital information stack released in 2020 and 2022, this series introduces a five-layered "tech stack" framework: network infrastructure, data infrastructure, device, application, and governance. The reports present findings from desk research and study tours conducted by GMF Technology in the summer of 2024, as well as recommendations for policymakers informed by these findings.

Acknowledgements

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A Note on Methods

This analysis provides an indicative, rather than exhaustive, overview of the PRC and Russia's technology footprint in Central Asia, offering key examples and highlighting where policymakers may focus their attention. This report is based on qualitative research, drawing from extensive open-source desk research. Sources include government publications, policy documents, sectoral reports from private industry consultancies, news articles, published books, and other publicly available materials. These publicly available materials are complemented by data collected through over 80 interviews conducted between October 2023 and June 2024 with dozens of experts based in Washington, Berlin, Almaty, Astana, Bishkek, and elsewhere. The interviewees included experts from academia, think tanks, ICT businesses, civil society, as well as both current and former public servants. The report also draws from observations at events held in June 2024, including the Central Eurasian Venture Forum in Almaty and the American Foreign Policy Council's CAMCA Forum in Bishkek.

The report methodology includes a few limitations. First, it depends on the availability and reliability of publicly accessible information. Second, the interviews reflect the views and knowledge of specific stakeholders and may not fully capture the full range of opinions and experiences in Kazakhstan, Kyrgyzstan, and Uzbekistan. Third, interviewees have been anonymized to safeguard their privacy, security, and confidentiality given the sensitivity of the subject matter. Despite these limitations, this report seeks to combine these research materials into a nuanced and well-sourced analysis for policymakers and other interested readers. The overarching aim is to consolidate the relevant information about China, and to a lesser extent Russia's, presence in the technological landscape of Kazakhstan, Kyrgyzstan and Uzbekistan.

Executive Summary

Central Asia's role as a geopolitical battleground among Russia, China, Europe, and the United States has grown in recent years as Western countries seek trade and digital connectivity routes that bypass Russian infrastructure. While Western discourse on a "Middle Corridor" through Central Asia has focused on railways, ports and pipelines, China's Digital Silk Road is quietly reshaping the region's digital landscape and deepening strategic dependencies on Beijing. At the same time, Central Asian governments are drawing primarily on PRC technologies and Russian regulatory models to strengthen their own digital authoritarian regimes, risking joint domination by the increasingly aligned governments in Beijing and Moscow.

China's increasing control over the region's "technology stack" could have an outsized impact on the future of digital connectivity, cybersecurity, and geopolitical competition across Eurasia. Russia's regulatory influence on the region's governments could shape digital governance norms across Eurasia. For Central Asian actors and Western policymakers invested in preserving the region's strategic autonomy, it is crucial to understand these vulnerabilities and offer viable alternatives in the information and communications technology (ICT) sector. Ensuring a resilient and diversified digital landscape in Central Asia is therefore not only a regional concern but a vital issue for global security.

This report seeks to shed light on the influence of Russia and China on the ICT sectors of three Central Asian countries: Kazakhstan, Kyrgyzstan and Uzbekistan. It uses the "technology stack" method adapted from two previous reports by GMF's Alliance for Securing Democracy (ASD) on the future internet and the digital information stack released in 2020 and 2022. The framework is used to examine one country's presence in and penetration of another country's technology and regulatory ecosystem. The analysis of the resulting dependencies provides an indicative, rather than exhaustive overview of Russia and China's technological footprint in Central Asia, offering key examples and highlighting areas where policymakers can focus their attention with the goal to de-risk digital technologies and governance in Central Asia.

Key Findings

- Central Asian states have developed strategic dependencies on and vulnerabilities to Russia and China across all layers of the tech stack. These interconnected weaknesses allow for greater leverage, disruption, and damage by external actors than any single dependency alone.
- Despite these vulnerabilities, Central Asian governments still have discretion to manage their dependencies. They are sovereign balancers, looking to avoid dependence on any one actor while maximizing their own interests.
- Russia and China's strengths in Central Asia's technology stack are complementary to one another, and competition between Russian and PRC firms is unlikely to jeopardize the Sino-Russian relationship.

- Despite their technological strengths, the United States and Europe face challenges in offering a viable alternative to Russia and China in Central Asia due to the region's small market, compliance burdens related to operating there, difficulties matching their competitors' pricing, and linguistic barriers.

Policy Recommendations

- Equip US and EU infrastructure finance organizations to compete with PRC alternatives
- Promote Open RAN standards as a tactic to dislodge PRC network equipment in Central Asia
- Position US and EU firms as network and data infrastructure suppliers for the Middle Corridor to strengthen the region's connectivity with European cloud markets
- Expand US and European Competitiveness in smart applications in strategic sectors such as e-governance across Central Asia
- Create public-private platforms for cross-sector collaboration
- Enhance regional resilience through capacity building exchanges with policymakers and public sector officials, focusing on transparency, cybersecurity, and governance standards
- Support Central Asian civil society organizations that provide transparency and analysis of the opaque technology stack conditions on the ground
- Expand their technology analytical capacities, and adopt the technology stack framework as a SWOT analysis tool for techno-economic statecraft

Before delving into the details of the Kazakh, Kyrgyz and Uzbek tech stacks, this report first contextualizes the position of these countries in a brief history of Central Asia and its foreign relations. It then discusses why the region and its tech stack are of significant strategic importance to transatlantic policymakers. Second, drawing on contemporary examples, this report uses GMF's tech stack framework to map China and Russia's presence in each of the three country's technology landscapes. Third, drawing from the case study findings, this report seeks to provide transatlantic policymakers key analytical insights and policy recommendations for strategic engagement with Central Asia.

Overview of Main Findings

Kazakhstan (See pp. 18 – 36)

Network Infrastructure	• Reliant on Russia for high-bandwidth international connectivity. • PRC firms have laid fiber-optic cables and supplied most telecom hardware. • ISPs are required to deploy Russian SORM systems with potential backdoors.
Data Infrastructure	• PRC and Russian firms are prominent in Kazakhstan's data infrastructure, including cloud, storage, and critical sectors. • This dependence heightens geopolitical risks and exposes key industries to potential disruption or coercion.
Device	• PRC brands Xiaomi, Oppo and Huawei, hold 32% of the Kazakh smartphone market, and PRC companies dominate the market for "safe city" surveillance cameras.
Application	• Russian and PRC digital platforms in Kazakhstan pose risks of surveillance, censorship, and information manipulation. • Dependence on PRC smart industry services increases vulnerability to exploitation and coercion.
Governance	• Kazakhstan aligns with Russia and China to advance digital authoritarian norms. • At home, Kazakhstan adopts similar practices, using Russian-style laws as well as PRC and Russian technologies.

Kyrgyzstan (See pp. 37 – 48)

Network Infrastructure	• Reliant on Russia and Kazakhstan for high-bandwidth international connectivity. • PRC network equipment and mandated Russian SORM surveillance systems further expose its digital infrastructure to security threats.
Data Infrastructure	• Growing reliance on PRC and Russian data centers, including a facility paid for by the Russian government and built by Russian company DataDome to store official data.

Device	• PRC firms dominate the "safe cities" surveillance camera market, while PRC brand Xiaomi holds 38% of the smartphone market. • These technologies raise security concerns due to potential data transfers to the PRC and agreements to share surveillance data with Russian authorities.
Application	• Kyrgyzstan bans TikTok but relies on Russian platforms like Telegram and VK, exposing users to cybersecurity and information manipulation risks. • Kyrgyzstan has signed a joint statement with the PRC seeking assistance in AI and smart solutions in e-government and other areas.
Governance	• Kyrgyzstan copies Russian cyber laws and has deepened cooperation with China on surveillance and digital policing practices.

Uzbekistan (See pp. 49 – 61)

Network Infrastructure	• Reliant on Russia and Kazakhstan for high-bandwidth international connectivity. • Chinese network equipment and mandated Russian SORM surveillance systems further expose its digital infrastructure to security threats.
Data Infrastructure	• Huawei built the data center supporting the country's e-government services, and Uzbekistan's national cloud runs on Huawei's Cloud stack, creating dependency risks.
Device	• PRC brands Honor and Xiaomi hold 30% of the smartphone market according to Statista and dominate the "safe cities" surveillance camera market.
Application	• High cybersecurity and information manipulation risks due to Telegram's prominence. • Extensive partnerships with Chinese smart solutions firms create widespread dependencies open to potential disruption or coercion.
Governance	• Blends China's restrictive cyber governance with Russian influence. • Uzbekistan selectively adopts, adapts, or emulates their digital governance practices based on local capacity and needs.

Assessing China's and Russia's Technology Footprint and Associated Risks in National Technology Ecosystems

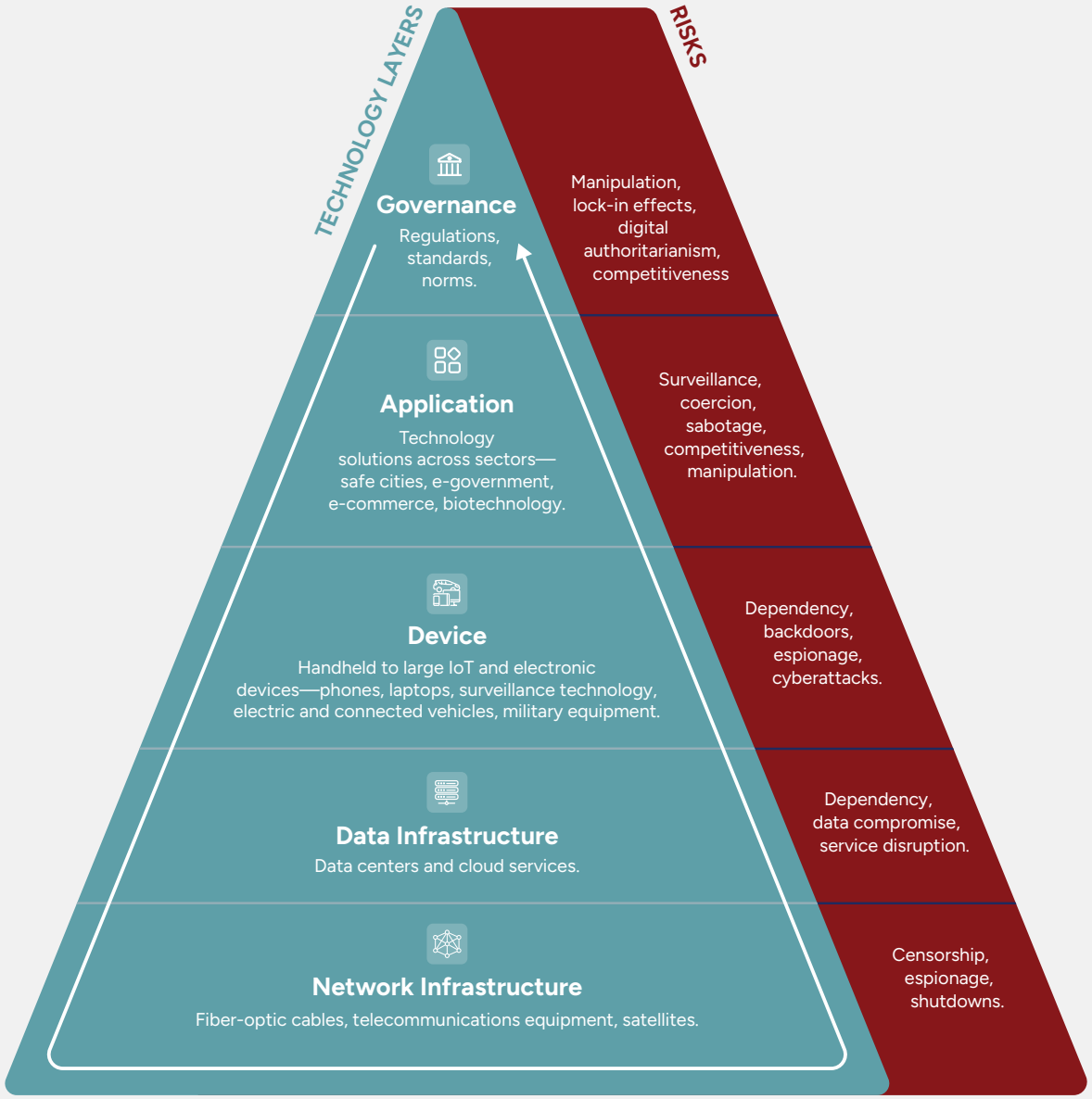

Figure 1 — The tech stack framework illustrates how China's and Russia's digital footprint penetrates a country's technology ecosystem and the associated risks across five layers: network infrastructure, data infrastructure, device, application, and governance.

The Technology Stack Framework

Familiar to technologists, the term "tech stack" refers to all aspects of information technology (IT) infrastructure required to deploy and manage digital applications and services: hardware and software components, databases, middleware, storage and networking.[1] In the recent past, GMF and others have transferred the concept to the policy discourse, broadening it to include the hardware, governance, and infrastructure that a country's digital systems are built on.[2]

The tech stack framework (figure 1) builds on two prior studies by GMF's Alliance for Securing Democracy program. The first, Lindsay Gorman's 2020 "Future Internet for Democracies: Contesting China's Push for Dominance in 5G, 6G, and the Internet of Everything" presented a "Future Internet technology stack" to analyze China's expanding footprint in global telecommunications, the Internet of Things, applications, and international technical standards -- and the threats it poses to the United States and its allies.[3] The second, in 2022, "China and the Digital Information Stack in the Global South" by Bryce Barros, Nathan Kohlenberg, and Etienne Soula adapted this stack framework to the digital information landscape and applied it to five country case studies: Thailand, Myanmar, Uganda, Nigeria, and Jamaica.[4]

In this analysis, the tech stack framework spans five layers to assess how the PRC and its affiliated entities penetrate and influence the breadth of the technology landscape in Kazakhstan, Kyrgyzstan and Uzbekistan: network infrastructure, data infrastructure, device, application, and governance. Each layer is examined in relation to the potential dependency or influence risks therein.

Network Infrastructure Layer: The physical infrastructure that transforms isolated computers into a vast, interconnected network defining the modern internet. It includes but is not limited to optical cables (terrestrial and undersea), telecommunications equipment, satellites, and space-based connectivity infrastructure.

Risks: Actors with malicious or autocratic intent who control network infrastructure can censor, filter, or shut down internet access, and reroute, copy, and exfiltrate data flows for espionage and surveillance purposes.

Data Infrastructure Layer: The physical infrastructure used to store, manage, access, and process data, including cloud technology and data centers. These technologies are foundational to compute-intensive applications like AI, connected devices in the Internet of Things (IoT), and smart and safe cities.

Risks: Actors with malicious or autocratic intent can abuse control over data centers and cloud infrastructure to create dependencies, compromise sensitive data, and disrupt key services.

Device Layer: The physical devices used by individuals or institutions to access the internet such as hand-held consumer devices like mobile phones, tablets, and laptops. This layer also encompasses IoT devices, such as surveillance equipment; larger devices such as electric and connected vehicles; and equipment used in defense and law enforcement.

Risks: Actors with malicious or autocratic intent can abuse their dominance in device manufacturing to create dependencies and gain strategic leverage, while backdoors built into these devices enable data theft, cyberattacks, network infiltration, and espionage.

Application Layer: The application of technological tools, systems, and innovations to tackle sector-specific challenges and enable new capabilities. It comprises hardware, software, data analytics, and digital platforms used to deliver tailored solutions to consumers, sectors, and industries. This layer therefore includes technology solutions that are applied across sectors like sectors like public security (surveillance systems, safe cities), digital services (e-government), education (e-learning platforms), transport (smart traffic systems), manufacturing (robotics, automation), healthcare (telemedicine, biotechnology), and consumer-facing applications (e.g. e-commerce, e-finance, social media).

Risks: Actors with malicious or autocratic intent c an leverage their dominance in digital services to create strategic dependencies and gain commercial advantages. By controlling social platforms, they can surveil users, harvest data, and manipulate public discourse. Additionally, their control over critical applications enables them to disrupt or disable critical infrastructure, including energy grids, transportation networks, and financial systems.

Governance Layer: The legal and normative framework that governs technology use across the entire tech stack. It serves as a "layer of layers", including regulations, norms, and standards.

Risks: Actors with malicious or autocratic intent can circumvent or find loopholes in a country's data protection laws and other relevant technology-related regulations. They do this through knowledge-sharing initiatives and by influencing standards-setting bodies to institutionalize their regulatory models. Their influence on technical standards also poses cybersecurity risks, as they retain deep knowledge of system vulnerabilities, which they can exploit.

Introduction

Figure 2 — *Central Asia*
Source: International Data Corporation (IDC), "Kazakhstan as a Regional Digital Hub"

Central Asia is a rapidly growing and digitalizing region. According to World Bank statistics, only 62% of individuals in Kazakhstan used the internet in 2012, and under 20% of individuals in Kyrgyzstan and Uzbekistan. This share has risen to well over 90% in all three countries today.[5] Over the past decade, Central Asian governments released and implemented ambitious digitalization plans. Kazakhstan released Information Kazakhstan, its first digitalization plan in 2013, followed by the much more ambitious "Digital Kazakhstan" plan in 2018.[6] Kyrgyzstan launched its Digital Transformation plan in 2019,[7] and Uzbekistan released its own national plan in 2020.[8] The implementation of these plans has not only expanded internet access across the region, but also laid the groundwork for vibrant digital economies that deploy 5G and AI in service of smart applications in sectors ranging from e-commerce, to logistics, public services, and more. In Almaty, Bishkek, and Tashkent, entrepreneurs are building Fintech, Edtech, and Health technology ventures, supported by state-backed innovation hubs and startup programs.[9]

Each government has subsequently released new digital transformation plans to reflect their substantial progress in connecting more citizens to the internet,[10] and they now outperform peer countries in the development of high-quality e-government services. Kazakhstan's Digital Transformation Concept (2023 – 2029), for instance, says that 99% of the population has internet access, up from 70% in 2015, and over 90% of public services are available online.[11] According to the United Nations' eGovernment Development Survey 2024, Kazakhstan and

Uzbekistan both rank in the "very high" category while Kyrgyzstan ranks in the "high" category. Kazakhstan is a notable leader in e-government, ranking 24th in the world, ahead of France, China and Canada.[12]

This surge in digitalization has occurred in parallel with both an economic and demographic boom. According to the European Bank for Reconstruction and Development (EBRD) the region is growing quickly, at an expected rate of 5.9% in 2025, and half of its 80 million people are under the age of 30.[13] The members of this rising generation, born after the collapse of the USSR, are digital natives.[14] The rapid adoption of digital services is not only driving demand for digital infrastructure, but challenging Soviet-era authoritarian traditions as avenues for political discourse and identity formation open up on social media and in other digital spaces.[15]

This era of rapid digitalization—driven primarily by PRC and, to a lesser extent, Russian technologies—has introduced several risks to individual liberty and national sovereignty throughout the region. First, even as Central Asia has digitalized and as its young population has discovered new forms of expression online, the region's governments have also adopted more digital authoritarian practices. All three countries in this report have adopted Chinese "smart city" surveillance technologies and received training from Chinese security forces in digitalized policing and riot management.[16] In parallel, they have also adopted, and in many cases directly copied, Russian laws governing both civil society and cyberspace. The cumulative effect of Chinese technology and Russian-style governance has been to expand regional governments' ability to monitor citizens, regulate speech, and reduce the ability of independent observers to assess the country's digital sector and practices.

Second, the heavy influence of Russia and China in their digital transformation has created strategic dependencies and vulnerabilities for actors in the region at a time in which Russia and China are more aligned than ever. A regional expert in geopolitics and cybersecurity interviewed for this report remarked that regional governments had previously believed their security could be guaranteed by positioning themselves in the "fulcrum" between Russia and China. As Russia and China have grown more aligned in the aftermath of Russia's invasion of Ukraine, and as Central Asian economies have become more reliant on Chinese technologies, the expert noted, this "fulcrum" has vanished. As examined in the case studies, the Kazakh, Kyrgyz, and Uzbek governments recognize these risks in their ICT sectors to varying degrees and have taken steps to reduce their exposure, such as preferring European equipment in their core telecommunications networks. However, these measures alone are insufficient to fully mitigate the risks of technological dependence on Russia and China, as in practice Central Asian states have an interest in obtaining the best technology solutions at the most reasonable cost.

Third, Russia continues to pose a coercive risk to the region's sovereignty and territorial integrity. A leaked April 2024 report revealed Moscow's ambition for the region was to place itself at the center of a Eurasian trade bloc capable of rivaling the United States, the EU, and China.[17] President Vladimir Putin and senior Russian nationalists have repeatedly asserted a "natural" Russian sphere of influence over the region, even questioning the legitimacy of Kazakh and Uzbek statehood. These revanchist claims, combined with enduring structural leverage over the region's fiber-optic and trade routes, constrain Central Asia's efforts to fully diversify away from Moscow.[18]

Lastly, as demand for digital services grows, so does the region's strategic reliance on network and data infrastructure providers, which could entrench Russian and Chinese influence if the region is unsuccessful in diversifying its options. The Middle Corridor, an infrastructure project that promises to unlock new trade and

internet traffic routes across the Caspian and Black Seas, provides an alternative to reliance on the "Northern Corridor" through Russia, and includes participants stretching from Kazakhstan to Eastern Europe.[19] Historically, these Russian pipelines and railways have not only carried most of the region's exports,[20] but the fiber-optic fables running alongside them have also carried the region's internet traffic. The International Data Corporation (IDC) notes in a 2023 report that the region relies almost exclusively on fiber-optic cable connections running through Russian territory to connect with the global internet.[21]

Current Directions of Transit Traffic via Kazakhstan

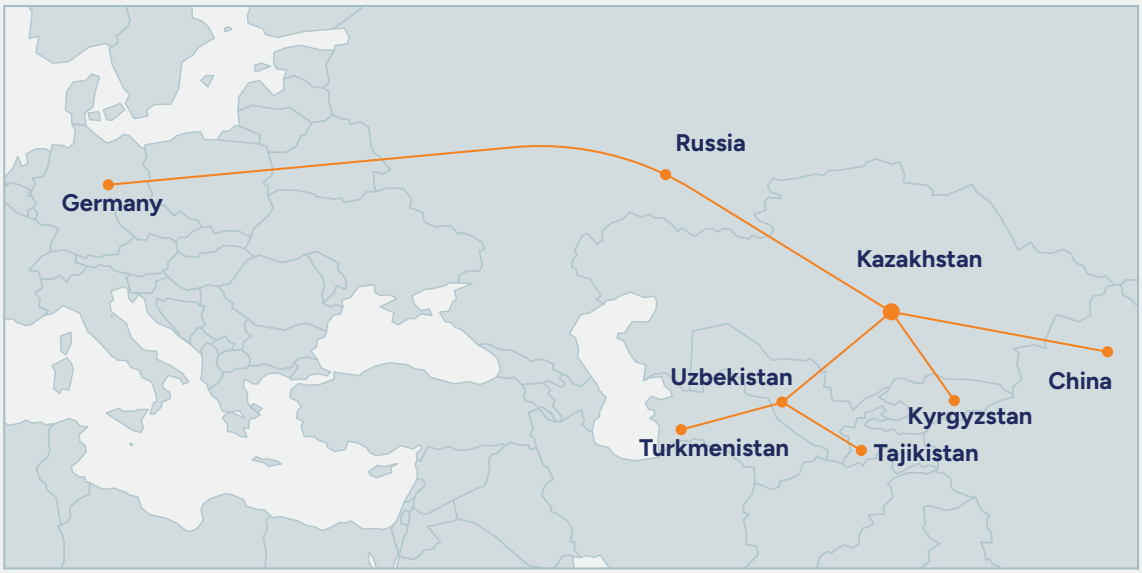

Figure 3 — *Existing international fiber optic cable routes carry internet traffic from Central Asia through Russia to the rest of the global internet. This leaves Central Asia dependent on fiber optic infrastructure in Russian territory.*

Source: International Data Corporation (IDC), "Kazakhstan as a Regional Digital Hub

Of particular interest to the People's Republic of China (PRC), the "Middle Corridor" would provide an alternative trade and internet traffic route to Europe in the event of great power conflict.[22] Major PRC figures like international relations scholar Wang Jisi and PLA General Liu Yazhou have written that connectivity across Central Asia and onto Europe could strategically "dismantle US encirclement of China", and blunt the impact of a possible US blockade of PRC trade across the Indian Ocean.[23] Xi Jinping, the PRC's current leader, was already building on these ideas when he announced the Belt and Road Initiative (BRI) at Nazarbayev University in Astana, Kazakhstan in September 2013.[24] Two of the BRI's three overland trade routes connecting China to Europe's lucrative markets run from Xinjiang through Central Asia.[25] Reflecting its strategic interest in this region, the PRC has invested $64 billion in Central Asia over the past 30 years,[26] including not only physical infrastructure like railways and pipelines,[27] but also digital infrastructure like telecommunications networks alongside it.[28]

Alternative trade and fiber optic routes between China and Europe

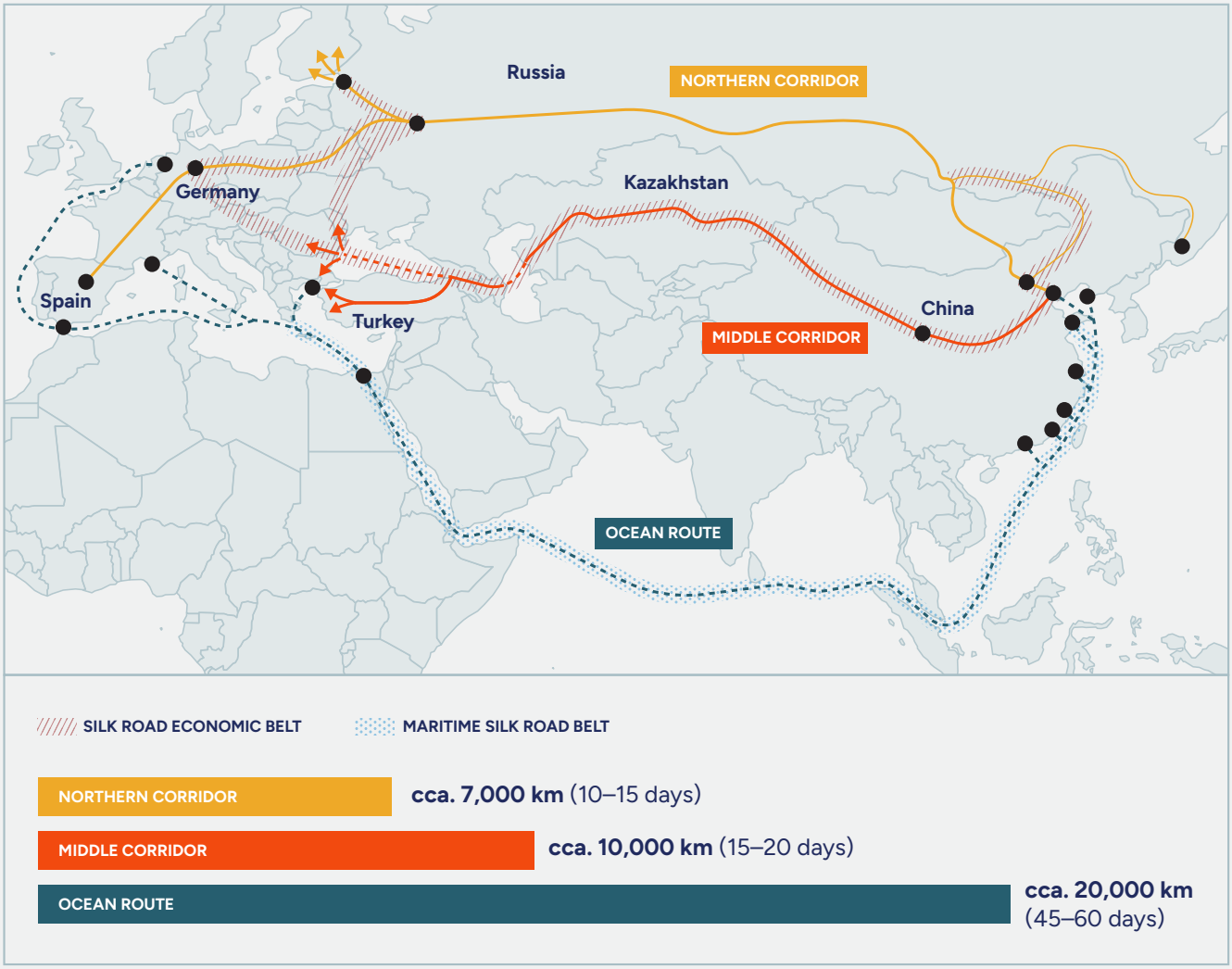

Figure 4 — *Alternative routes between China and Europe. Note that the Middle Corridor avoids both contested sea lanes and Russian territory.*
Source: Adapted from Baku Research Institute, "Middle Corridor: from Western-Initiated TRACECA to China's Belt and Road Initiative."

The BRI's digital component, the Digital Silk Road (DSR), was introduced in 2015.[29] At the inaugural Belt and Road Forum in 2017, Xi pitched the DSR as a collaborative platform for building digital infrastructure including the deployment of "big data, cloud computing, and smart cities".[30] Central Asian leaders have embraced the DSR, which has brought needed investments in their digital infrastructure. Positioning Central Asia as a digital hub would not only improve domestic connectivity but also attract international cloud providers seeking low-latency, cost-effective alternatives to submarine cable routes threatened by geopolitical risks.[31] This could spur foreign investment in regional digital infrastructure, create high-value-added jobs, and integrate Central Asia into global cloud and data value chains.[32]

The region is also attracting growing interest from a broader set of global players. Türkiye aims to lead through the Organization of Turkic States (OTS) , a political and cultural bloc that promotes cooperation among Turkic countries, and is a major supplier of military drones to the region.[33] Japan and South Korea have long invested in the region's infrastructure and technological development.[34] Then-Korean President Yoon Suk Yeol toured the region in June 2024, proposing a partnership on critical minerals and technology transfers, including an advanced technology cluster in Tashkent.[35] Saudi Arabia and Gulf countries are also investing heavily in technology, with Kazakhstan collaborating with the UAE on digital finance[36] and co-founding a startup accelerator with Saudi Arabia.[37] The EU launched its "Global Gateway" initiative in 2021 in part to compete with China's BRI, including in Central Asia.[38] As part of this effort, the EU—through its Team Europe initiative, which pools resources from EU institutions and member states—launched a digitalization initiative on Central Asia in November 2022. European Commission President Ursula von der Leyen unveiled a €12 billion investment package for Central Asia at the April 2025 EU–Central Asia summit in Samarkand, including €100 million for satellite internet via Team Europe.[39]

With global initiatives re-engaging with Central Asia, the region has returned to center stage in geopolitics. The region's geographic centrality in the heart of Eurasia in an era of great power competition means that control over the region's technology stack could have profound strategic consequences for Europe and the United States. Chinese control over the region's technology stack could, for example, route a significant portion of Europe-Asia traffic through PRC-controlled collection points in Central Asia. The region is at the nexus of technological transformation and profound changes in global commerce, where the promise and peril of its newfound significance are ever-present.

Country Case Studies: China and Russia in the Tech Stack

Kazakhstan, Kyrgyzstan, and Uzbekistan each illustrate how Russian and PRC influence extends across Central Asia's technology stack, shaping both infrastructure and governance. While their levels of exposure vary, all three rely heavily on Russian and PRC network infrastructure and cloud services, embedding long-term dependencies, and enabling digital authoritarian practices. These case studies provide insights into how external actors use technology to entrench influence, shape norms, and secure strategic advantages in the region.

Kazakhstan and the Technology Stack:

Kazakhstan has balanced its technology stack more effectively than the other case study countries but remains deeply vulnerable to Russian and PRC influence in key layers. Vulnerabilities in the network infrastructure layer are the most notable given Kazakhstan's strategic role as Central Asia's primary internet hub. Russia has near-chokepoint control over Kazakhstan's high speed international fiber-optic cable routes, and PRC vendors play a significant role in providing Kazakhstan's domestic network equipment, exposing Kazakhstan to significant espionage and coercion risks. While US providers are the leading providers in the Kazakh market as they are globally, PRC and Russian cloud companies like Huawei and Yandex are also among the leading cloud service providers in the country and are actively investing in Kazakhstan. PRC firms play a major role in smart industrial solutions across manufacturing, automotive, and transportation sectors, creating dependencies that could be exploited. Russia's influence is particularly strong in the governance layer, as many of Kazakhstan's cyberspace and civil society laws mirror Russian legislation. These vulnerabilities pose risks to Kazakhstan's digital sovereignty, economic resilience, and long-term strategic autonomy.

Kazakhstan and the Network Infrastructure Layer:

- Kazakhstan relies on high-bandwidth fiber-optic cable connections that transit through Russia.
- While Kazakhstan's network equipment sourcing is diverse, PRC firms like Huawei have laid fiber-optic cables and is a key provider of telecom hardware, particularly at the network edge.
- Russian SORM surveillance systems, which could include backdoors and monitor internet traffic, are mandated for internet service providers (ISPs).

TERRESTRIAL FIBER-OPTIC CABLES AND INTERNET TRAFFIC ROUTES:

Kazakhstan and its Central Asian neighbors rely almost exclusively on high-bandwidth fiber-optic cable connections through Russia to reach the outside world.[40] Consequently, data sent within, between, and through Central Asian networks are often routed through Russian networks. In a 2020 report, Réseaux IP Européens Network Coordination Centre (RIPE NCC)[41] found that most international communications reaching Central

Asia pass through both Kazakhstan and Russia. Even a significant fraction[42] of local traffic within Central Asia transits to external internet exchange points (IXPs)[43] in Russia and back to Central Asian locations.[44] For example, a separate 2023 RIPE NCC study testing[45] data flows between Kazakhstan and Radio Free Europe's Kyrgyz branch found that the data first passed through the autonomous system (AS)[46] of Rostelecom, Russia's largest telecommunications company and a state-affiliated entity.[47]

Russia acts as the main upstream provider linking Kazakhstan to the global internet through established fiber-optic routes, including the Transit Europe-Asia (TEA)[48] and Diverse Route for European and Asian Markets (DREAM) cables.[49] Kazakhstan itself serves as the primary gateway for its Central Asian neighbors. This fiber-optic network configuration poses security and surveillance risks for any data flows passing through Russian territory, and the inefficient routing patterns negatively affect latency-sensitive digital services and increase internet costs generally. Recognizing this vulnerability, Kazakhstan is working with neighboring Azerbaijan to build a fiber-optic cable across the Caspian Sea—the Trans-Caspian Fiber-optic Cable (TC-FOC)—to diversify its internet traffic connectivity with Europe.[50]

The Trans-Caspian fiber-optic cable route

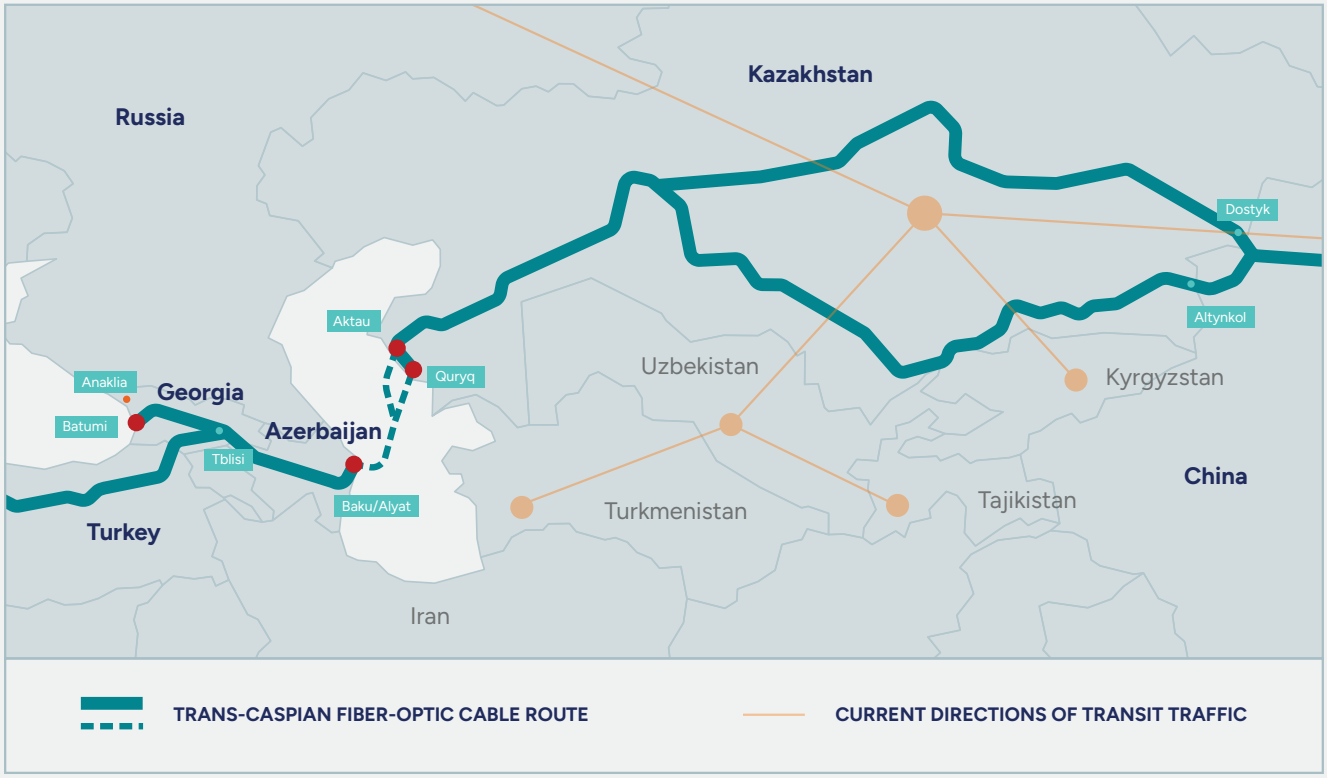

Figure 5 — *The Trans-Caspian fiber optic cable is a joint project of the Kazakh and Azerbaijani governments. It would provide a high-bandwidth alternative to Russia routes, alleviating the region's strategic dependence. It would also carry a significant amount of Europe-Asia internet trafic.*

Source: Adapted from IDC, "Kazakhstan as a Regional Digital Hub" and News.az.

This current limited upstream connectivity makes all of Central Asia susceptible to disruptions originating in Russia, with countries downstream similarly vulnerable to issues originating in Kazakhstan. For example, in August 2024, WhatsApp and Telegram users experienced service disruption in Kazakhstan following comparable internet slowdowns in Russia.[51] In an August 2024 interview with Kazakh news outlet Taspanews, Kazakh digital rights experts Elzhan Kabyshev and Kazakh internet security expert Mikhail Klimarev explained that these and comparable disruptions were likely the result of Russian tests to restrict internet resources, and that these restrictions affect all Central Asian countries reliant on the fiber-optic routes through Russia.[52]

Kazakhstan also has terrestrial fiber-optic cable connections to China, with known border crossings at Altynkol and Zharkent near Khorgos, a border town home to a major dry port built through the BRI.[53] Another known cross border connection is at Dostyk, where a new rail connection to China is expected to be completed by the end of 2025.[54] Terrestrial fiber-optic cables are often co-deployed with infrastructure such as railways and pipelines to cut costs.[55]

Regional ICT experts consulted for this report believe that these co-deployments are likely to extend beyond the rail projects at Khorgos and Dostyk. For example, Huawei has been contracted to implement its "smart railways" solution for Temir Zholy, Kazakhstan's national railway company.[56] The solution includes the installation of "modern fiber-optic infrastructure."[57] Furthermore, in December 2024, in a joint statement following the Fifth China-Central Asia Foreign Ministers' meeting in Chengdu, all parties agreed to "strengthen cooperation in connectivity" including in "highways, railways, aviation, shipping, multimodal transport, logistics and transportation, port construction, data optical cables, etc." The joint statement, signed by Kazakhstan's Minister of Foreign Affairs Murat Nurtleu, suggests that fiber-optic cables may be deployed alongside infrastructure projects supported by Beijing.[58]

Kazakhstan's Network Operators

Kazakhstan's terrestrial fiber-optic networks are primarily operated by three major telcos, Kazakhtelecom, TNS-Plus, and Transtelecom[59], and connect to the outside world mostly through Russian state-affiliated providers Rostelecom, Megafon, Vimpelcom and Kvant-Telecom.[60] Freedom Telecom is a relatively new entrant to the market, but is notable for its ambitious expansion plans.[61]

Kazakhtelecom is the largest telecommunications company in the country and is majority state-owned. According to the IDC, Kazakhtelecom uses both Infinera, a US-based Nokia subsidiary,[62] and Huawei equipment in its backbone network.[63] Kazakhtelecom is the dominant first, middle, and last-mile service and connectivity provider in the country.[64]

TNS-Plus is a Kazakh telecom provider which is wholly owned by DAR Group, a holding company that operates as a technology incubator.[65] According to the IDC, TNS-Plus' fiber-optic network was installed by Huawei.[66]

Transtelecom JSC is a partially state-owned telecom company,[67] with 25% held by Kazakhstan's national railway Temir Zholy,[68] which partners with PRC rail,[69] and e-commerce[70] companies such as Alibaba. Temir Zholy has also worked with Huawei to modernize its networks by introducing SD-WAN technology.[71] According to the IDC, Transtelecom's fiber-optic network uses equipment from the US's Cisco, French provider Ekinops, and Huawei.[72] Huawei has the largest share by kilometer, providing 11,000 kilometers out of Transtelecom's total of 25,000 kilometers. Though in terms of capacity, Huawei provides only 400Gbps (gigabits per second) out of a total of 1,150Gpbs.[73]

Kar-Tel, which operates the cellular brand Beeline, is a Kazakh telecom company that forms part of the country's backbone network.[74] VEON, a Netherlands-based multi-national telecommunications company with origins in Russia, owns 75% of the company, the remainder is owned by Kazakh billionaire Bulat Utemuratov.[75] It uses the Beeline brand, whose trademark is licensed by Russia-based Vimpelcom.[76] Beeline Kazakhstan has worked with Huawei and ZTE to promote 4G[77] and pilot 5G[78] across the country.

Freedom Telecom, formerly telco DITel LLP [sic], was acquired by Kazakh brokerage firm Freedom Holding in January 2024.[79] Both companies are owned by Russian-born billionaire Timur Turlov, who obtained Kazakh citizenship in 2022 after renouncing his Russian and Saint Kitts and Nevis citizenships.[80] Freedom Telecom is a new market entrant, positioning itself as a key player in Kazakhstan's digitalization and infrastructure plans.[81] In February 2024, Kazakhstan's Ministry of Digital Development signed an agreement with Freedom Telecom to build a West-East fiber-optic hyperhighway by 2026, which the Ministry said would boost the volume of Europe-Asia traffic transferred through Kazakhstan and improve the country's competitiveness in digital services.[82] As of October 2023, Freedom Holding was under investigation by the US Department of Justice and Securities Exchange Commission for possible aid to Russia in circumventing US sanctions.[83]

MOBILE NETWORKS:

Multiple experts interviewed for this report believe that the proportion of PRC equipment used in Kazakhstan's wireless networks must be significant.[84] The most compelling publicly available estimate comes from the field work of Oyuna Baldakova, the Lead Kazakhstan Researcher at King's College London's DIGISILK project. Two of her interviewees, anonymous former ZTE and Huawei employees respectively, estimated that Huawei controls between 70% to 80% of the network equipment market, while the remainder is distributed among other firms as part of diversification measures. Neither Baldakova nor this report's authors could identify publicly available sources to corroborate this claim.[85]

The dominant Mobile Network Operators (MNOs) in Kazakhstan are Beeline Kazakhstan, AKA **Kar-Tel**, and mobile companies **Kcell** and **Tele2-Altel**, formerly owned by Kazakhtelecom, now owned by Qatar-based Power International Holding as of January 2025.[86] Together, they represent over 70% of the market,[87] with remaining brands operating on Beeline or Tele2-Altel networks.[88]

As of 2023, according to the ITU's publicly accessible Data Hub, 97.7% of Kazakhstan's population has access to at least 3G connectivity, and 87.3% have access to LTE/WiMAX. As of 2023, only 5% of the population had access to 5G.[89] The Kazakh government's Accessible Internet Project (2023 – 2027) aims to achieve 5G coverage in 75% of the areas within Almaty, Astana and Shymkent, and 60% of the areas within smaller regional cities.[90]

Kazakhstan's Ministry of Digital Development, Innovation and Aerospace Industry (MDDIAI) auctioned off two blocs of 5G mobile spectrum to Kcell and Tele2-Altell in December 2022. Beeline Kazakhstan and Freedom Telecom, also participated but were not allocated spectrum.[91]

All three dominant telecom providers use Chinese equipment in their networks. As early as 2009, Kazakhtelecom signed an agreement with the Bank of China and Huawei to acquire loans[92] for Huawei equipment.[93] Huawei helped Kazakhtelecom implement LTE networks and connect rural areas through fixed wireless access. [94] In an April 2018 article from Silk Road New Observation Network, a company spokesperson was quoted as saying that Huawei works with "leading operators in [Kazakhstan], such as Kazakhtelecom, Kcell, Beeline, Tele2… cover[ing] all regions of the country through partners in the operator business and equipment field." [95] Beeline has partnered with multiple vendors to trial 5G, including a 2019 trial in Shymkent using Nokia equipment, and a Huawei-led trial in Astana in 2021; the company has also worked with ZTE to optimize its 4G network.[96]

Freedom Telecom has also looked to PRC equipment providers. In September 2024, its owner Timur Turlov told the South China Morning Post (SCMP) that Freedom was in talks with partially state-owned PRC financial firms to fund its telecom strategy, and that Freedom Telecom would purchase Huawei and ZTE equipment using PRC yuan.[97]

Oyuna Baldakova's field research indicates that telecommunications operators in Kazakhstan are aware of the dangers associated with depending too heavily on a single supplier and have adopted both formal and informal practices to manage this exposure. These practices are intended to ensure vendor diversification—particularly in areas tied to critical infrastructure—and to curb the dominance of any one company. Several of Baldakova's interviewees mentioned that Huawei faces unofficial limitations when it comes to involvement in sensitive state

infrastructure projects, though no formal regulations exist to confirm this. According to Baldakova, such decisions are typically made by telecom operator's chief technology officers and do not reflect official state policy.[98]

Western network equipment providers also play an important role in the Kazakh landscape. In September 2023 Kcell signed a seven year agreement with Ericsson to deploy 5G.[99] Beeline uses Nokia equipment alongside Huawei and ZTE.[100] Juniper and Cisco also have a presence, and according to interviews conducted for this report and by Baldakova are the preferred providers for core networks in government institutions, whereas Huawei equipment is primarily used for access networks on the periphery.[101] Such deployment patterns are not easily reversed. The economics of telecom infrastructure create powerful vendor lock-in effects. As one Kazakh industry representative explained to Baldakova, "it's simply not profitable for [mobile operators] to change [or replace equipment] when the networks are already at least 50% built."[102]

However, limiting Huawei equipment to peripheral networks may not be sufficient to protect against espionage and national security risks, because even presence in peripheral networks enables bulk collection of data that could be used for espionage, or even to disrupt communications networks in the case of open conflict. Moreover, the rise of 5G networks has begun to blur the distinction between core and periphery networks, as more and more computational and data resources are required to power Internet of Things applications.[103]

In 2022 Kazakhtelecom indicated that it would bring Open RAN technology to Kazakhstan, possibly opening the door to greater involvement for Western providers. Open RAN, or Open Radio Access Network, refers to a telecom architecture that allows interoperability between hardware and software from different vendors—reducing reliance on proprietary systems. But as of 2023 it was not clear to what degree Open RAN has been integrated into the market.[104]

Open RAN is a new approach to building mobile networks that breaks up traditional, proprietary systems so that different companies' equipment can work together—making networks more flexible, and less dependent on a few foreign suppliers, especially in 5G.

SATELLITE CONNECTIVITY:

Kazakhstan's primary publicly stated interest in satellite broadband is bringing internet connectivity to isolated, hard-to-reach rural communities where fiber-optic cables are not economical.[105] Beyond this narrow application, satellite connections offer too little bandwidth at too high a cost in comparison to fiber-optic networks to be a sustainable, scalable solution for the region.[106] That said, in times of conflict, satellite broadband can provide a resilient backup for communications networks.[107] In pursuit of these benefits, the Kazakh government entered into partnership with Luxembourg's SES in 2021, London-based Eutelsat OneWeb in 2023,[108] and received its first batch of Starlink equipment in 2024.[109] Kazakhstan also signed an agreement for satellite broadband with US-based Hughes Network Systems in September 2024.[110]

The deals with Western vendors have caused concerns among Kazakh officials, who, according to one expert interviewed for this report, worry that these satellite services may not align with domestic internet controls.[111] In May 2024, the director of Kazakhstan's Kokterek Space Communications Center, Roman Ermashov, said that "projects using foreign satellite communications systems in non-geostationary satellite orbits" are required to install a gateway station "on the territory of the Republic of Kazakhstan," but that Starlink had refused to comply.[112] In February 2025, the Times of Central Asia reported that Kazakh authorities were considering a ban on the import of Starlink and other satellite communications devices, citing Article 23 of Kazakhstan's Law on National Security, which prohibits the operation of foreign-controlled communications networks in the country.[113]

Bruce Pannier, a journalist with long experience covering the region, noted in a February 2025 article for the Times of Central Asia that these gateways would provide Kazakh authorities with a "kill switch." "Kazakh officials," Pannier writes, "do not want citizens to be able to disseminate anti-government information or organize or coordinate protests using technology that the government cannot shut down at a moment's notice." Pannier noted that Kazakh authorities are in talks with alternative providers Amazon Kuiper and Shanghai Spacecom Satellite Technology Co., "which seem amenable to the idea of establishing gateway stations in Kazakhstan".[114]

SORM SURVEILLANCE SYSTEMS:

Kazakh law requires telecommunication companies to purchase and install System for Operational Investigative Measures (SORM) technology—a Russian-origin technology that raises concerns about Moscow's potential access to Kazakh communications.[115] SORM is a network of surveillance hardware and software for intercepting communications through deep packet inspection (DPI), a surveillance method in which the content of data is decrypted and inspected as it passes through checkpoints in a network, among other methods. The Kazakh government originally acquired this equipment from Russian companies, including VAS Experts, Protei, MFI-Soft, iTecho, Speech Technology Center, and Oxygen Software.[116] The use of these systems not only exposes domestic opposition to state surveillance, but, according to Gavin Wilde of the Carnegie Endowment, heightens concerns that Russia may have visibility into Kazakh networks.[117] PRC firms have updated aging SORM equipment in Kazakhstan, which raises similar concerns.[118] Notably, Kazakhtelecom uses a DPI system separate from SORM.[119]

Kazakhstan and the Data Infrastructure Layer:

- Kazakhstan's data infrastructure—including data centers, storage hardware, and cloud services—is heavily shaped by China and Russia.
- Huawei dominates the data storage market and both countries play leading roles in the country's expanding cloud and data center sector.
- PRC provider Lenovo works with major government and financial institutions, and Huawei provides cloud solutions to Kazakhstan's national railway company.
- Russian firms Yandex and 1C are key cloud services providers in a wide variety of industries.
- Kazakhstan's reliance on these providers creates vulnerabilities, as both countries could exploit their position to disrupt or sabotage the financial, industrial and transportation sectors, among others.

DATA CENTERS IN KAZAKHSTAN:

Kazakhstan's data center landscape is shaped by a mix of foreign hardware vendors, rapid growth in government-led cloud adoption, and ongoing efforts to expand and upgrade national infrastructure. An IDC report on Kazakhstan's ICT sector found that, in 2022, Dell and HPE controlled 45% and 20% of Kazakhstan's server equipment market respectively.[120] Lenovo, a PRC computer hardware company, followed with 15% market share, and showed the highest growth rate in the Kazakh market that year.[121] In the data storage market, Huawei held 60% market share in 2022, followed by Dell EMC at 18% and NetApp, an American cloud storage provider, at about 7%.[122] Huawei showed the greatest growth in sales in this market segment, which had tripled compared to 2021, followed by Lenovo and NetApp, which each doubled their sales.[123]

According to a December 2023 IDC report on the ICT market in Kazakhstan, the Kazakh government is the leading user of cloud technologies in the country and is responsible for the large-scale deployment of data center infrastructure.[124] The Ministry of Digital Development (MDDIAI) is tasked with constructing data centers and allocating bandwidth in support of the state's digitalization program and e-government services.[125] Many local operators are building their own cloud infrastructure to offer local cloud services. Kazakhtelecom, Transtelecom, Qazcloud, NIT, and KT Cloud Lab have each deployed data centers or cloud services for national projects and government agencies.[126] Freedom Telecom has also signed an agreement with the MDDIAI to build two Tier-III data centers to support data transit and international traffic. The first will support the "G4 City" special economic zone near Konayev in the Almaty region, and the second will be built in Aktau, which is the Kazakh landing site for the Transcaspian fiber-optic cable project.[127]

According to a USAID report, the Kazakh government has established data centers in 14 major cities across Kazakhstan which are all centrally monitored from a server center in Astana.[128] The IDC estimates that the installed capacity of data centers in Kazakhstan doubled between 2019 and 2022, reaching 2,897 racks by the end of 2022.[129] The vast majority of these facilities are believed to be at Tier II standards, meaning that they do not meet the highest possible design and security standards at Tier IV.[130] According to USAID's 2023 report, several Kazakh telecom operators said their organizations may transition to Tier III standards.[131] Private Kazakh companies, including Kazteleport JSC, a subsidiary of Halyk Bank, and QazCloud, a Kazakh cloud company, have also opened up data centers in the country.[132]

CHINA AND RUSSIA IN THE KAZAKH DATA CENTER MARKET:

PRC firms are actively investing in Kazakhstan's data center infrastructure in the government, manufacturing, logistics, and financial sectors. However, due to limited public disclosures it is difficult to assess the full extent of their influence. Two Kazakh digital rights experts interviewed for this report noted that while government agreements with PRC ICT firms are sometimes announced in public memoranda, the actual contracts are not public, limiting transparency on PRC firms' role in major digital infrastructure projects such as the construction of data centers.[133]

While public information on China's involvement in constructing data centers is limited, there are occasional reports, such as in 2019 when Kazakh press outlets reported that an unnamed PRC company began construction

of a data storage center in Baiterek, and that another was being built by CETC near Astana.[134] In April 2019, PRC press outlets reported that Inspur Weihai Overseas Service Co., Ltd. and Kazakhstan National Railways Telecommunications Company signed an agreement at the second Belt and Road Forum in Beijing. The two sides agreed to jointly promote the construction of data centers in Kazakhstan and support the Digital Kazakhstan initiative.[135]

Some PRC companies have also been keen to highlight their investments in Kazakhstan's data infrastructure.[136] In a featured company profile within the IDC report, Lenovo said it "is actively investing in increasing its resources and presence in the region... Lenovo's customers in the Kazakhstan market include the largest cloud providers, government agencies, leading financial institutions and manufacturing companies." During its 2023 Partner Conference in Almaty, Huawei announced that it considers the promotion and construction of data and cloud infrastructure as a top priority for the company's Kazakhstan operations.[137]

Russian companies—particularly Yandex—also maintain a significant and growing presence in the data center market. Yandex, a major Russian technology company, operates its own data centers in Kazakhstan, and according to two Kazakh tech sector experts interviewed for this report, is a major data center provider in the Kazakh market.[138] In April 2024, Yandex opened a cloud region in Kazakhstan supported by server infrastructure in Karaganda. The company said the move was part of its long-term development strategy in the Kazakh market.[139] According to an April 2024 post on Yandex Cloud's company blog, the company has provided 74 Kazakh companies grants for roughly $300,000 worth of cloud infrastructure, and it works closely with the country's start-up ecosystem, including Astana Hub, a government-affiliated tech incubator.[140]

THE US AND EU ROLE IN THE KAZAKH DATA CENTER MARKET:

In contrast to Russian and PRC firms, major Western cloud providers have a limited physical footprint in Central Asia. According to industry experts, Western providers including Microsoft, Oracle, NetSuite, AWS and others are popular cloud vendors in Kazakhstan but rely on data centers outside the region to service Central Asia. One Kazakh tech entrepreneur explained that outside of regional sales offices, major western data cloud providers "don't have infrastructure here. There are no AWS servers, no Azure."

However, the Kazakh government has approached Western cloud providers to explore opportunities for establishing high-quality data centers in the region. In September 2023, MDDIAI signed an agreement with AWS to purchase the Outposts cloud computing solution, a private cloud, for integration within the QazTech platform, which is meant to support technology entrepreneurs and accelerators. According to USAID, the ministry is also working with AWS to establish a Tier III data center in the country.[141] In April 2023, MDDIAI signed an agreement with Microsoft establishing a data hub in Kazakhstan, and was also in talks with Google.[142] At the October 2023 Digital Bridge Forum, Kazakhstan's President Kassym-Jomart Tokayev said he "reached appropriate agreements" with Amazon, Google, Mastercard and Citigroup to build data centers, with a priority on AI.[143] In May 2024 Beeline announced that its subsidiary QazCode would create the region's "first GPU Cloud" for AI using Nvidia tech.[144]

THE CLOUD SERVICES MARKET IN KAZAKHSTAN:

Kazakhstan's cloud services landscape is shaped by a mix of local regulatory constraints and foreign competition, with distinct roles played by Kazakh, Russian, Western, and increasingly PRC providers. The IDC estimates that the public sector accounts for 50 to 60% of Kazakhstan's GDP, making the government a major, if the not the biggest, customer in the cloud services market.[145] Other major users include the mining, hydrocarbon and financial industries, though these private actors prefer to use private cloud infrastructure, which is not captured in the IDC's analysis of the market.[146]

The public cloud market in Kazakhstan can be broken into three categories:

1. **Infrastructure as a service (IaaS)** provides customers with computer hardware resources at a data center maintained by the provider.[147]
2. **Platform as a service (PaaS)** provides application developers with a ready-to-use toolbox of hardware, software, and development tools, enabling them to build, test, and deploy applications without managing the underlying infrastructure.[148]
3. In a **Software as a service (Saas)** model, the software provider owns and maintains the applications, which are hosted on the cloud for users to access without needing to download and store on their devices.[149]

The table below shows that Western and Russian providers are highly prominent in the SaaS and PaaS markets, while Kazakh firms have a firm grip on the IaaS market.[150]

The Cloud Services Market in Kazakhstan (2023)

Cloud service type	Share of the Kazakh market by revenue	Share of Cloud service provided by foreign registered companies	Leading Providers in the Kazakh Market		
			Kazakh origin	Western origin	Russian origin
IaaS	19%	39%	Qaz Cloud PS Cloud Transtelecom JSC	AWS Microsoft	N/A
SaaS	73%	69%	Kazakhtelecom Documentolog	Microsoft SAP AWS	1C
PaaS	8%	92%	N/A	Microsoft Azure AWS Google	1C

Figure 6

Source: Adapted from IDC, "ICT Market in Kazakhstan 2018 - 2027", p.90-93.

Since IaaS requires storing and processing personal data, local Kazakh players, especially state-owned or affiliated enterprises, occupy the majority of the market. One main reason for this is that the country's data localization laws stipulate that personal data has to be stored in server rooms in Kazakhstan.[151] Since many industries—such as banking, telecommunications, and e-government—rely on cloud services to process and store sensitive user data, compliance with these regulations has made local subsidiaries or partners a popular choice for foreign companies.

In the SaaS and PaaS markets, 1C, a Russian company popular throughout former Soviet republics, competes with global players like Microsoft, AWS, Google, and SAP in the SaaS and PaaS markets. In Saas services, the vast majority of the cloud service market by revenue, Kazakhstan's enterprise management software market is dominated by two players – SAP and 1C. SAP's customers are concentrated in international companies in heavy industry, transportation, and in some Kazakh government agencies.[152]

According to the IDC, 1C is in demand in all fields, especially in the retail, distribution, education and industrial sectors.[153] This characterization may underplay 1C's role in the market. According to two technology industry experts interviewed for this report, 1C "dominate[s] the market" to the point of "near monopoly" in financial, accounting, and enterprise software, largely because 1C is more affordable, and localized for Russian speakers. The Ukrainian parliament has considered two bills, introduced in October 2023 and August 2024, to ban 1C and other Russian digital services on suspicion that confidential data stored by the company could be exfiltrated by the Russian government, or used as a means for mass sabotage. The August 2024 bill is supported by Ukraine's Cabinet of Ministers.[154] Finally, Yandex established a Kazakhstan cloud region in April 2024, and was cited as a major cloud services provider by several experts interviewed for this report.[155]

Despite the lack of statistics there is evidence of PRC involvement in the cloud sector in news reports, corporate announcements and other publicly available materials. In 2018 and 2019, the Kazakh and PRC governments signed MOUs in which they agreed to collaborate in e-governance, big data, and cloud computing. During a September 2019 state visit to China, President Tokayev said that Kazakhstan was "interested in creating joint innovative enterprises, technology parks and IT centers with Chinese companies."[156] During that visit, Kazakhstan also signed a joint research agreement with PRC cloud company Inspur, and the PRC agreed to supply Kazakhstan's Al-Farabi University with a supercomputer.[157]

In May 2023 PRC Leader Xi Jinping and his Central Asian counterparts signed the Xi'an Declaration, in which the "two sides encourage expanded cooperation in high-tech areas such as artificial intelligence, smart cities, big data, and cloud computing." During the Huawei Partner Conference in Almaty the same month, Huawei identified the promotion of its cloud solutions—such as infrastructure for LAN, WLAN and WAN networks, CloudEngine switches and iMaster NCE platforms for automatic intelligent network management—as a top priority in the corporate sector.[158]

The same month, Kazakhstan's Temir Zholy, the national railway company, signed an agreement with Huawei to implement cloud solutions in its transportation infrastructure.[159] In June 2024 Kazakhstan Railway Worker, a rail industry website, reported that the partnership had "completed the first stage of modernization of data networks by introducing SD-WAN technology… providing centralized monitoring of… network devices and communication

channels" to Temir Zholy's main office in Astana.[160] According to a March 2024 Xinhua news report posted on the Guangdong Provincial Department of Commerce's website, the general manager of Huawei in Kazakhstan said that Huawei Cloud's Pangu LLM would be also be implemented into Temir Zholy's operations.[161]

Kazakhstan and the Device Layer:

- The PRC's presence in Kazakhstan's market for personal devices is less pronounced than in network and data infrastructure, but PRC brands hold a sizeable minority share.
- These devices pose security risks as they may contain backdoors and other systematic vulnerabilities.
- The PRC dominates the sub-segment of facial recognition cameras and IoT devices for "safe cities" programs, enabling digital authoritarian governance practices.
- Experts also warn of risks to data privacy, as they suspect these systems transmit personal data back to the PRC.[162]

PERSONAL DEVICES:

The widespread use of PRC-made smartphones and computers in Kazakhstan has raised concerns about potential backdoors and surveillance risks. According to the IDC, Kazakhstan overwhelmingly relies on foreign suppliers for personal computers.[163] The largest suppliers in 2022 were companies from the United States (HP, Dell), Taiwan (Acer), and China (Lenovo). Only three Kazakh vendors are listed for the personal computing market. Bely Veter (shop.kz) and ASLI (asli.kz) are electronics retailers with e-commerce platforms, while Logycom, describes itself as a "manufacturer of high-tech equipment."

According to Finprom.kz, a Kazakh business and finances news website, Samsung and Apple occupied most of the smartphone market as of July 2022, followed by Xiaomi, Oppo and Huawei, which together held a share of 32% of the market.[164] In Kazakhstan, the mobile market is highly strategic, as it is the primary method for accessing the internet. According to Statista, in 2022, 84.1% of Kazakh households used a mobile connection to access the internet, in contrast with about 45% of households who used fixed-line broadband connections.[165] Mobile connections are often the only practical choice, as broadband infrastructure has, in many cases, not penetrated far enough into rural regions and remains expensive.[166]

INTERNET OF THINGS (IOT): SAFE CITIES IN KAZAKHSTAN

The use of PRC surveillance cameras in Kazakhstan is widespread, particularly in the deployment of "safe city" initiatives, in which IoT and AI-enabled infrastructure is used to optimize municipal services. While it is difficult to ascertain how effective these initiatives are in achieving their stated aims to reduce crime and police traffic violations, the mass deployment of these AI-enabled systems raises concerns about data breaches, espionage, state surveillance, and technical dependencies on PRC vendors.[167]

Kazakhstan's first "safe city" program began in the small city of Aqkol in 2019.[168] Bradley Jardine, Managing Director of the Oxus Society for Central Asian Affairs, toured Aqkol's smart city "command center" in 2023.

He found that it uses smart cameras provided by PRC firms Dahua and Hikvision, as well as other hardware provided through China's DSR initiative. The facility uses face ID scans to control entry, while monitors display all connected devices in the network and the data they collect. This includes "everything from solar panels and gas meters to GPS trackers on public service vehicles and surveillance cameras." Analysts working there oversee "data on energy use, school attendance rates and for police investigations" and report to the mayor's office.[169]

According to Kazinform, a Kazakh news outlet, Kazakhstan has deployed 1.36 million cameras nationwide, 310 thousand of which are connected to police command centers.[170] The Times of Central Asia reported in November 2024 that Kazakhstan had launched a national video monitoring system, piloted in Astana and Almaty, with the capability to "recognize faces, detect abandoned objects, capture [criminal] offenses, and identify vehicles by make, model, and color."[171] Multiple experts interviewed for this report noted the prevalence of Chinese surveillance cameras, emphasizing that cameras had been installed extensively in schools across the country, including in classrooms.[172]

As of October 2024, Kazakhstan's e-governance website listed 17 "safe city" projects in every region of the country.[173] Sergek, a domestic Kazakh company and Kazakhstan's premier smart cities vendor, has publicly stated that it uses Dahua cameras in its solutions.[174] In April 2018, Astana Times reported that Sergek had deployed 6,365 cameras so far, with plans to install and launch 13,000 additional road cameras in the following two months.[175] Sergek's equipment is used in Astana's smart city infrastructure, though as of February 2025, management of this system had been handed over to UAE-based company Presight by Astana's municipal council.[176]

Kazakhstan and the Application Layer:

- Russian and PRC platforms, including Telegram, VK, and TikTok, are popular in Kazakhstan, creating risks of surveillance, censorship, and information manipulation by Moscow and Beijing.
- YandexGO, a ride-hailing app owned by Russian tech giant Yandex that dominates the Kazakh market, poses espionage risks due to the sensitive geolocation data it collects on its users.
- PRC firms play a leading role in smart industrial solutions across sectors such as manufacturing, automotives, and transportation, creating dependencies that could be exploited for disruption or coercion.

INFORMATION PLATFORMS:

Russian and PRC platforms contend with Western alternatives in Kazakhstan's information platform market. These platforms are popular among Kazakhs aged 14-35, roughly 40% of the population. Instagram, TikTok, Telegram and YouTube are the most popular platforms by wide margins.[177] Data Reportal's 2024 Digital Report shows that Instagram and TikTok lead Kazakhstan's social media landscape, with user bases of 12 million and 14 million respectively, and advertising reach covering the equivalent of 66.5% and 77.5% of Kazakh internet users, respectively.[178] Data Reportal does not have comparable data for YouTube or Telegram, though Telegram's founder Pavel Durov says the platform has 12.5 million monthly users in Kazakhstan.[179] There is no reliable data

on the number of WhatsApp users, but according to surveys by Central Asia Barometer, most Kazakhs prefer that Meta-owned platform to Telegram.[180] Apart from TikTok, PRC social media apps are not widely used in the country.[181]

TikTok:

Kazakhstan is the only one of the three case study countries in this report that has not imposed a ban on TikTok. TikTok remains widely used and actively engages with both the Kazakh government and the tech sector. TikTok poses national security risks because it gathers data on users that could be accessed by the PRC government for the purposes of surveillance, censorship, and the curation of content meant to manipulate public opinion in ways favorable to the PRC.[182]

TikTok opened a representative office in Kazakhstan in 2023.[183] TikTok also runs a "TikTok StartUp Academy" out of its office in AstanaHub, a government funded IT Park that functions as an incubator and accelerator for Kazakh startups. [184] Program participants are taught how to use "TikTok marketing tools" and generate short-form video content. They also have the opportunity to receive a grant for marketing placement on TikTok up to $10,000.

In October 2023, President Tokayev met with TikTok CEO Shou Zi Chew on the sidelines of the Digital Bridge Forum in Astana. They discussed cooperation in "the creative industry, advancements in AI research, e-commerce development, and the global promotion of Kazakhstan's culture and tourism opportunities via TikTok." Tokayev praised TikTok for being "one of the first [social media companies] to translate its interface into the Kazakh language and appoint a commissioner for the prevention of cyberbullying."[185] He was referring to measures required by a law passed in 2021 that requires foreign social media companies to register in Kazakhstan, open local offices, and have local Kazakh employees block illegal content, or any other content flagged by Kazakh public officials.[186]

During Kazakhstan's 2023 parliamentary elections, TikTok announced that it would "filter inappropriate content" including "false messages about changing the date of the election, materials aimed at intimidating voters or interfering with the voting process, and other inaccurate content."[187] Kazakh political scientist Danila Bekturganov wrote that this amounts to TikTok "participating in political censorship in Kazakhstan," because the broad definition allows any materials that are "objectionable to the Kazakhstani [sic] authorities" to fall under the definition of "inaccurate content."[188]

In April 2024, a member of the Kazakh parliament advocated for blocking TikTok, citing dangers to children. [189] In September 2024, a Kazakh Senator raised similar issues, including data confidentiality concerns, saying that unless TikTok took steps to protect children, a ban could be necessary.[190]

Telegram:

Telegram is one of the most widely used messaging applications in Kazakhstan, with 12.5 million monthly users as of 2024.[191] The platform enjoys a strong reputation for privacy protection, contributing to its widespread adoption in the region. However, cybersecurity experts have raised concerns about its actual security, pointing to vulnerabilities that could expose users to surveillance, data leaks and information manipulation. Given Telegram's

documented role in Russian cyber and influence operations, understanding its risks is crucial for assessing the broader digital security situation in Central Asia.

Cybersecurity expert Slava Gomzin has argued that Telegram may not be as secure as widely believed. First, Telegram has never made its server code public, leaving no assurance that it does not indefinitely retain sensitive information like chat logs and geolocation data or share it with third parties.[192] Gomzin points out that outside cybersecurity experts do not "know how Telegram manages metadata," which "can compromise privacy by exposing who is communicating, when, and where." Second, Telegram does not use end-to-end encryption by default, meaning that the platform can access and store conversations unless users manually enable it. Third, Telegram's proprietary messaging protocol has not been independently audited, leaving its reliability unverified by outside security experts.[193]

In February 2023, Russian opposition activists told investigative reporters from WIRED magazine that their messages had been monitored and read by Russian security forces, leading to their arrests.[194, 195] The activists suspected that Telegram had complied with the Kremlin's legal requests—requests that, in Russia's authoritarian political system, often lack formal judicial oversight. Telegram told WIRED reporters it suspected that FSB officers had instead extracted the data using a phone-hacking tool like Cellebrite.[196] Gomzin argues that given the holes in Telegram's security it is difficult to assess how the messages had been obtained.[197] Independent Russian investigative journalist Andrei Zakharov reported in March 2024 that Russian security forces have several methods to take advantage of Telegram's vulnerabilities and de-anonymize users.[198]

The widespread use of Telegram in Kazakhstan raises concerns that the data privacy of millions of users may be compromised. The app also creates additional cybersecurity and information manipulation risks. The Ukrainian government banned the use of Telegram on state-issued devices in September 2024 over data privacy concerns.[199] In December 2024, the New York Times reported that Ukrainian officials were considering further restrictions after the country's intelligence service concluded that the platform had been "used by Russia for disinformation, cyberattacks, hacking, spreading malware, location tracking and adjusting missile strikes."[200] Russia's use of Telegram for information manipulation has also been documented in Kazakhstan, including false claims in 2023 that Kazakhstan would host a NATO peacekeeping center in Almaty, as well as American bioweapon labs.[201] The latter echoed a narrative used to justify Russia's invasion of Ukraine.[202]

Vkontakte (VK):

Vkontakte (VK) is another platform of Russian origin in Kazakhstan that poses surveillance and information manipulation risks. A January 2020 VK press release claims that the platform has 7.2 million users in Kazakhstan.[203] According to an expert from the German Council on Foreign Relations (DGAP) the Russian state has used VK to censor and spy on citizens since at least 2014, when Alisher Usmanov, an Uzbek-born Russian oligarch with a direct personal relationship to Putin, became a major shareholder through his investment company USM Holdings.[204] The Ukrainian government banned VK in 2017 over concerns that the platform was used by the Russian government to amplify Russian information manipulation campaigns.[205] In December 2021, Russian state-owned enterprises acquired 57.3% of the company's voting rights.[206]

SMART APPLICATIONS IN STRATEGIC SECTORS:

Kazakhstan's growing adoption of PRC smart technologies across strategic sectors is deepening its technical dependence on PRC vendors. These systems, embedded in everything from industrial production to transportation and logistics, give China increasing leverage over Kazakhstan's digital and physical infrastructure. This dependence also raises risks of economic coercion, surveillance, and loss of control over sensitive data and systems.

Industrial Applications: According to a December 2024 report by Halyk Finance Research, part of the Kazakh financial services giant Halyk Group, PRC companies have focused their attention on the mining, energy and manufacturing industries in Kazakhstan. In January 2025, The Times of Central Asia reported that Yesil Technology Company, a subsidiary of China's Shaanxi Kaizhuo Electronic Technology Co., Ltd., would begin building a $12 million industrial drone production facility in the Almaty region in March 2025. The South China Morning Post reported in February 2025 that a PRC company, AgiBot, established a joint venture in Kazakhstan to build robotics manufacturing facilities, a "data factory" for training robotic systems and a research and development center.[207]

Connected Vehicles: In both private and public transportation, PRC connected devices are increasingly popular in Kazakhstan. These vehicles pose cybersecurity risks due to their ability to collect vast amounts of sensitive user data, which could be accessed or exploited for surveillance, data exfiltration, or cyberattacks.[208]

According to DK news, a Kazakh news service, PRC auto makers Great Wall Motors, Chang'an Auto and Chery all have an official sales presence in Kazakhstan. With more than 24,7000 vehicles sold in 2024, Chery is the most popular PRC brand, ranking number four overall in the market behind Hyundai, Chevrolet and Kia.[209] Sales of these PRC connected vehicles are growing rapidly. Chery's 2024 sales alone dwarf the total number of PRC-origin EV sales to Kazakhstan in 2023 and 2022 combined. In October 2023, China's EV giant BYD signed an agreement with Kazakh auto dealer Astana Motors, granting it distribution rights for BYD vehicles in Kazakhstan. [210] Both Kazakh and PRC officials have cited the EV market as a priority for collaboration.[211] In November 2022, President Tokayev personally launched the construction of an Almaty factory overseen by Astana Motors producing PRC brand Chang'an, Chery and Haval vehicles, calling it a "very important project for our country".[212]

PRC connected vehicles are not limited to private transportation. PRC company Zhengzhou Yutong Bus Co., Ltd. supplies electric busses to municipal governments through a joint venture with local manufacturer QazTehna LLP.[213] The busses are outfitted with smart "Internet of Vehicles" technology, including real-time data monitoring, remote control, and surveillance cameras.[214] Yutong's company YouTube page features a promotional video in which Astana receives 20 such vehicles.[215]

Ridehailing: YandexGo is a ride-hailing platform operated by Russian tech giant Yandex, and enjoys a wide user base in Kazakhstan.[216] The company's dominance over the ride-hailing market in Kazakhstan is so pronounced that Kazakh authorities have characterized its position as a monopoly.[217] This monopoly became a national security issue when, in 2023, Russia enacted a law granting the FSB "round-the-clock access" to YandexGo's Russia-based databases, allowing Russian security forces to track user trips across the more than 20 countries where the service operates, raising concerns that the platform could be used for espionage and intelligence-gathering.[218] Kazakh authorities took action by suspending Yandex's local domain in August 2023, saying that YandexGO had

violated data localization laws by storing user data outside Kazakhstan. Yandex completed the transfer of its servers for its local domain to Kazakhstan in December 2023, though this move did not fundamentally alter the platform's vulnerability to external control and influence, as Yandex's corporate governance remains rooted in Russia.[219]

Logistics: As discussed in the data infrastructure layer, Temir Zholy, Kazakhstan's national railway company, has signed agreements with Huawei to use its cloud technologies. Huawei has been contracted to implement its "smart railways" solution, which outfits rail systems with connected cameras, real-time sensors, and modern fiber-optic infrastructure.[220] Many of the devices are monitored and supported by Huawei's Pangu Railway AI model, which carries out an automatic fault identification process that detects damaged equipment and infrastructure in need of maintenance to prevent service disruptions.[221]

Kazakhstan and China have collaborated deeply on railway digitization efforts to promote greater freight connectivity along the Middle Corridor. In an interview with Azerbaijani news outlet Report.az, Gaidar Abdikerimov, Secretary General of the Trans-Caspian International Transport Route (TITR) International Association, noted that Huawei and Temir Zholy had jointly established an "innovation center" in Xi'an in February 2024 to implement the smart railway solution in Kazakhstan.[222] Later that year, in July, President Tokayev and PRC Leader Xi Jinping jointly attended a digital opening ceremony for the China-Europe Trans-Caspian International Transport Route (CETCITR), expanding freight transit along the Middle Corridor.[223] By September 2024, the Xi'an municipal government announced efforts to accelerate "the interconnection of information systems with foreign railway companies," reinforcing China's broader push for digital railway integration across Eurasia. [224]

Kazakhstan and the Governance Layer:

- In the Governance Layer, Kazakhstan has aligned with Russia and China to advance digital authoritarian norms at the UN, including state control over online information flows, expansive surveillance, and restrictions on digital freedoms.
- Kazakhstan has also adopted digital authoritarian governance practices, often supported by technologies and trainings provided by Russia and China.
- Many of Kazakhstan's laws on cyberspace and civil society are modeled after Russian legislation.

DIGITAL AUTHORITARIAN NORMS AND PRACTICES:

Kazakhstan has adopted technical tools and governance models that enable surveillance, censorship, and centralized control over digital infrastructure. Through international cooperation, technical training, and regional security forums, Kazakhstan is increasingly embedded in a broader Eurasian architecture of digital repression.

Global Governance and Norms: Kazakhstan has worked alongside Russia and China to promote digital authoritarian governing norms. In 2015, the members of the Shanghai Cooperation Organization (SCO), including Kazakhstan, Russia and China, submitted an update to the International Code of Conduct for Information Security to the UN

General Assembly, which aimed to legitimize censorship and state control of the internet in the name of state sovereignty and security.[225]

Internet Shutdowns and State Dominance over Network Infrastructure: While Russia and China have configured their network infrastructure quite differently,[226] both have centralized state control over those networks to monitor, disrupt, and intercept internet traffic.[227] The Kazakh state dominates its network infrastructure to such a degree that it can shut down internet access.[228] It used this power as part of a harsh crackdown on mass protests during the events of Bloody January in January 2022, when anger over rising fuel prices escalated into nationwide demonstrations against political and economic grievances.[229]

In 2019, the Kazakh government required the installation of root certificates into all devices. Kazakh users trying to access the internet at this time were redirected to web pages with instructions on how to install them. These certificates would allow the government to decrypt and inspect internet traffic, and to carry out so-called "man-in-the-middle" (MITM) attacks to disrupt service. [230] Between 2023 and 2024, the Open Observatory of Network Interference (OONI) analyzed network data from Kazakhstan and found that the government continues to deploy MITM attacks to block online content and services, including news media outlets and censorship circumvention tools like VPNs.[231] China's Central Cyberspace Affairs Commission has weaponized root certificates for MITM attacks at home and abroad for the purposes of both surveillance and service denial.[232]

Trainings: Russia remains a leading destination for Kazakhs pursuing higher education, and multiple ICT specialists interviewed for this report said that they had gained professional experience in Russia's technology sector. [233] PRC entities also provide training to both state and private actors. As early as 2015, members of Kazakhstan's ruling party visited Beijing, where they were taken on a tour of ChinaSo, a state-run search engine, to learn about how to use the internet to "combat corruption."[234]

Huawei invests in Kazakh universities and training programs.[235] According to the IDC, Huawei plans to build 50 ICT academies and training centers by 2025, with 20 operational as of April 2023.[236] One training center at the Almaty-based Kazakh-British Technical University, provides certifications in routing, switching, and network security.[237] At the September 2022 International Digital Forum in Astana, Kazakhstan's Science and Higher Education Ministry signed an MoU with Huawei to collaborate on training ICT talent in the country.[238] Kazakh trade officials have worked with Alibaba to train domestic companies to use the PRC e-commerce platform.[239]

In parallel to these commercial and technical trainings, Kazakhstan participates in regular meetings of the CIS Council of Ministers of Internal Affairs, a Russia-led platform through which member states share practices on policing and protest management. Belarusian officials report that Kazakh units have visited Belarus to study techniques for ensuring "public order" and suppressing mass unrest, such as the ones used during the 2020 protests in Belarus. These exchanges reinforce a regional architecture of authoritarian learning, where digital and coercive tools of regime stability are disseminated horizontally across Eurasia, often with Russia as the central node.[240] In September 2024 China launched a similar forum by hosting a first meeting between Central Asia's Ministers of Internal Affairs and the PRC's Ministry of Public Security, which applies advanced digital policing techniques in Xinjiang and elsewhere in China.[241]

LAWS AND REGULATIONS:

Kazakhstan has adapted Russian laws controlling civil society and online spaces to its own national context. Whereas not all of the following regulations touch directly on the digital sphere, the cumulative effect of these laws has been to expand the Kazakh government's ability to monitor its citizens, regulate their speech, and reduce the ability of domestic and foreign observers to assess the country's digital sector and practices.

Kazakhstan's **Law on Personal Data**, passed in 2013, is modeled after Europe's GDPR and enumerates several privacy rights.[242] However, vaguely defined national security exceptions give the government a significant amount of discretion to access personal data.[243] Kazakh experts interviewed by USAID emphasized that the legislation had robust protections in theory, but in practice lacked sufficient implementation and accountability mechanisms.[244]

The law was amended in 2016 to include **data localization** requirements, stipulating that organizations are required "to store databases containing personal data in the Republic of Kazakhstan." The **Law on Informatization** (2015) also requires organizations to store personal data "in server rooms in the Republic of Kazakhstan."[245] The provisions are similar to Russia's User Data Storage Law (2014), and to China's Personal Information Protection Law (2021).[246]

Kazakhstan has also adopted versions of Russian law that restrict media freedom and civil society organizations both online and offline. Kazakhstan's **Cyberbullying Law** requires that foreign internet platforms, including social media and messaging apps, establish local offices led by Kazakh citizens. These representatives are responsible for blocking illegal content or any material flagged by Kazakh authorities, with noncompliance leading to service restrictions or outright blocking.[247] This provision bears a striking resemblance to Russia's Landing Law, which also requires internet companies to establish local representative offices with local office heads who may be pressured by the Russian government to censor content.[248]

Kazakhstan's **Law on Mass Media** (2023) is adapted from Russia's mass media registration law, granting the government sweeping powers to control the press.[249] The law expands the definition of mass media to include online publications, obliging them to be registered with an authorized government body and have a physical presence in Kazakhstan.[250] It also gives the government broad powers to regulate speech through the arbitrary revocation of media licenses.[251] The law was amended in June 2024, further expanding government powers to monitor online content, and to deny accreditation to foreign media on national security grounds.[252]

The amendment's focus on foreign media, alongside other measures targeting foreign influence, has raised concerns among Kazakh civil society that authorities may adopt laws similar to Russia's **Foreign Agents Law**.[253] Originally passed in 2012, the Russian law required organizations receiving foreign funding to register as "foreign agents" but was later expanded to include individuals and groups under vaguely defined "foreign influence."[254] When Kazakhstan introduced a "foreign funding" tax registry in 2023, civil society actors suspected ulterior motives, given that the government has used restrictive tax regulations to monitor and limit civil society activities in the past.[255] In June 2024, Eurasianet reported that Russian and Kazakh officials had established a parliamentary-level mechanism to share experience on combating "the influence of foreign agents."[256]

Kyrgyzstan and the Technology Stack:

Of the three case study countries, Kyrgyzstan is the most vulnerable to Russian and PRC influence overall. The country's small economy and lack of state capacity compared to Kazakhstan and Uzbekistan make it more difficult for Kyrgyzstan to diversify its suppliers and resist Russian and PRC influence across all layers of the technology stack. Just as Kazakhstan does, Kyrgyzstan relies on Russian-controlled fiber optic routes and PRC-supplied telecom equipment, creating risks of disruption and espionage. At the data infrastructure layer, Russian and PRC vendors may have access to sensitive government data due to partnerships in data storage. PRC firms dominate the surveillance camera market and are helping a Kyrgyz state-owned enterprise develop domestic-brand personal and network devices, deepening the risk that sensitive data may be exfiltrated to the PRC through backdoors. Kyrgyzstan's vulnerability is most acute at the governance layer, where Russian influence is entrenched through the informal role of Russian security forces, and Russian laws are directly copied. Though less developed, PRC governance influence is growing as the administration of President Sadyr Japarov seeks to adopt PRC-style developmental and digital policing practices.

Kyrgyzstan and the Network Infrastructure Layer:

- Kyrgyzstan relies on high-bandwidth fiber-optic connectivity running through Kazakhstan and Russia.
- This leaves the country vulnerable to internet disruptions of either a coercive or technical nature originating upstream.
- PRC vendors like Huawei are key suppliers of the country's network equipment, particularly at the network edge, posing espionage risks.
- Russian SORM surveillance systems, which could include backdoors, are mandated for internet service providers (ISPs).

TERRESTRIAL CABLES AND INTERNET TRAFFIC ROUTES:

Network and Routing Dependencies:

Kyrgyzstan is highly dependent on Kazakhstan and Russia for its global access to the Internet. The internet registry RIPE NCC has found that a significant proportion of Kyrgyz traffic passes through the autonomous systems (AS) of upstream ISPs like Kazakh TNS-Plus and Russia's Rostelecom.[257] Traffic often follows an inefficient route. For example, RIPE NCC traceroutes[258] have found traffic between Kyrgyzstan and Kazakhstan passing through intermediary ASes, including in Russia and Hong Kong, leaving Kyrgyz traffic vulnerable to surveillance by the Russian and Kazakh governments. [259] Multiple experts interviewed for this report said that when the Russian and Kazakh governments throttled internet traffic, it caused disruptions downstream in Kyrgyzstan. This happened in August 2024, when Russia experienced widespread outages for major websites.[260] Ongoing regional infrastructure projects like the Trans-Caspian Fiber-Optic Cable could help reduce this dependency by creating new pathways to Europe that bypass both Russia and China.[261]

Kyrgyzstan's Fiber optic cable network

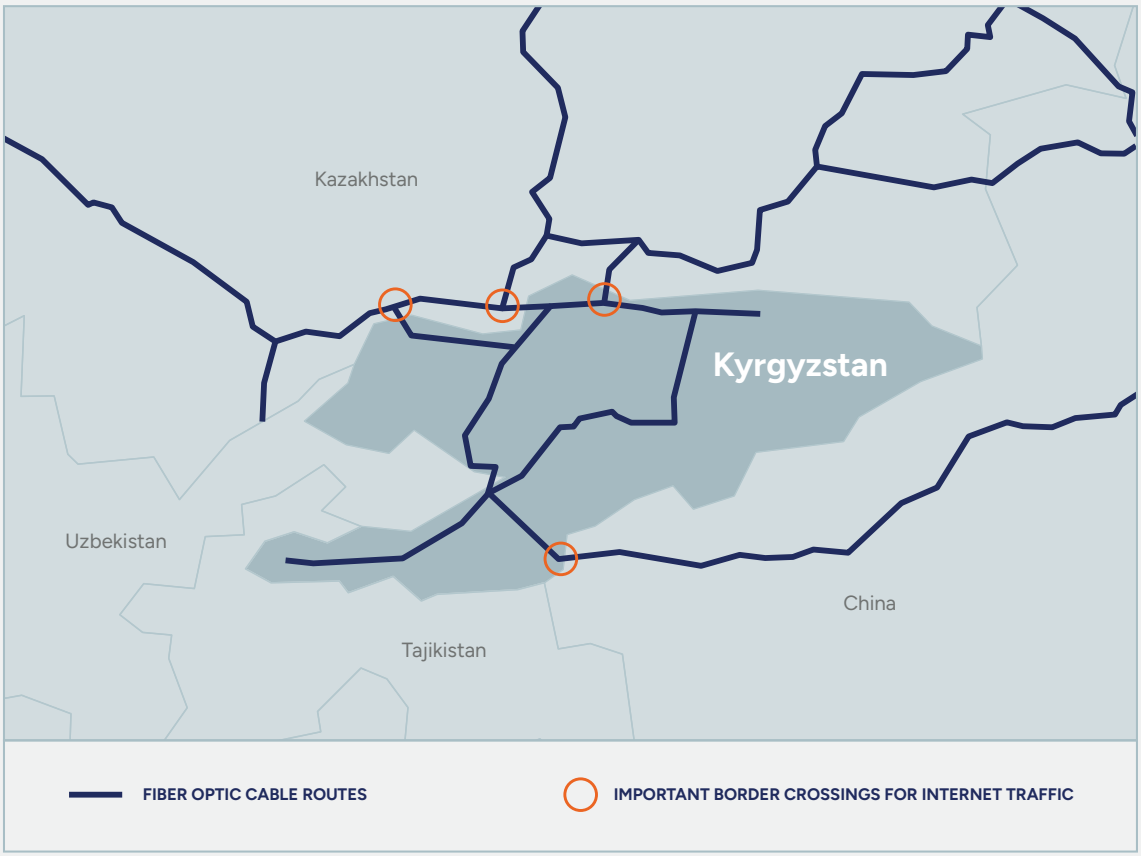

Figure 7 — *Kyrgyzstan depends on fiber-optic connects through Kazakhstan, and then on through Russia.*
Source: ITU

The Kyrgyz Association of Network Operators told RIPE NCC field researchers in spring 2022 that in the current situation disconnection from Russia could lead to a 20-25 % drop in internet traffic. Another major operator was quoted as saying that it could not peer with a key US internet service provider because the ISP's routers were not registered in Russia, nor could the operator enhance connections with internet operators in Germany due to Russian restrictions. While many Kyrgyz operators expressed concern over Russia's leverage to RIPE NCC interviewers, authorities saw the country's dependency on Russia for connectivity as a practical reality rather than a political issue.[262]

Experts interviewed by RIPE NCC, along with those consulted for this report, dismissed China as a viable alternative for internet connectivity, outside its use as a transit network. They cited limited in-demand digital content and resources located in China, as well as language barriers, app restrictions, and China's censorship practices.[263] Despite these limitations, Kyrgyz authorities have continued to engage with PRC technology providers.

Major Stakeholders in Kyrgyzstan's Terrestrial Cable Network:

Public data on Kyrgyzstan's networks is limited, and even local operators have limited insights due to a lack of coordination. RIPE NCC's fieldwork found that that there was "no shared understanding of the country's connectivity dynamics," among Kyrgyz operators. For example, some operators suggested to the researchers that there were "invisible," unannounced data transit links with Tajikistan and Uzbekistan, whereas others denied this.[264]

Transparency problems have been compounded by a 2021 amendment to the country's public procurement law, which allow state-owned enterprises to make direct purchases without tenders. Kyrgyz investigative journalism outlet Kloop reported the change would make it "impossible" to get visibility into a third of government spending, especially considering that state enterprises do not comply with requirements to publish the details of signed contracts.[265] These dynamics make the sourcing of telecommunications equipment opaque.

Nonetheless, public information shows that Kyrgyzstan is connected via fiber-optic links to neighboring countries, and to the world through the Transit-Europe-Asia network.[266] A May 2021 World Bank report found KyrgyzTelecom had the country's largest fiber-optic cable network, and dominated the retail broadband market with a 65% share, followed by Megaline (11.5%) and Saima Telecom, which primarily serves Bishkek and Chui oblast, at 6.5%.[267] The Kyrgyz government's 2024-2028 Digital Transformation Plan calls for expanding fiber-optic cable lines, and for co-deploying them with "transportation, energy and other infrastructure".[268] In a joint statement following the Fifth China-Central Asia Foreign Ministers' meeting in Chengdu in December 2024, Kyrgyzstan and China agreed to strengthen cooperation in connectivity, including both transportation and optical cables, suggesting that fiber-optic cables may be deployed alongside infrastructure projects supported by Beijing.[269]

Kyrgyzstan's Network Operators

KyrgyzTelecom, the largest ISP in Kyrgyzstan, and its partner MegaCom remain state-owned despite previous privatization plans. Both have been overseen by the Ministry of Digital Development's (MDD) since May 2022.[270] In 2009, KyrgyzTelecom signed a contract with Huawei to upgrade the country's fiber-optic lines.[271] In July 2024, KyrgyzTelecom and China Telecom signed a deal to modernize equipment at the Irkeshtam border crossing as part of the BRI.[272] That September, KyrgyzTelecom's Director General announced a plan to boost connectivity with China in partnership with an unspecified PRC firm at the third Central Asia Peering and Interconnection Forum in Bishkek.[273] This project aims to increase the bandwidth of this border connection to 300 Gbps, more than 100 times faster than the 2.5 Gbps connection the two countries shared in 2018.[274]

Elcat is another a key player in developing Kyrgyzstan's cable network and has focused especially on international connections, such that a significant proportion of traffic in Kyrgyz networks pass through Elcat's AS.[275] The company built connections to Kazakhstan in 2009, to China and Tajikistan in 2012, and in 2016, it installed equipment at the Moscow Internet Exchange. Elcat's partners include China Mobile, China Telecom, and China Unicom.[276] In April 2022, Elcat signed an MoU with Turkiye's Turktelecom to develop a terrestrial link between Ankara and Bishkek overland through Iran.[277]

Mobile Networks

Kyrgyzstan's mobile telecommunications sector is shaped by a challenging physical landscape, relatively modest consumer demand, and growing reliance on primarily PRC technology providers. According to a 2023 report by BMI Fitch Solutions, Kyrgyzstan has three dominant mobile network operators (MNO). **MegaCom** holds 38.7% of the mobile market, followed by **O!**, a mobile brand operated by Kyrgyz telco NUR Telecom, at 31.2%, and finally **Beeline Kyrgyzstan**, with 22% of the market.[278] Netherlands-based VEON announced its exit from the Kyrgyz market in March 2024 after selling its 50.1% stake in Beeline Kyrgyzstan to Nepal-based CG Corp Global. The remainder is held by the Kazakh investment group, Verny Capital.[279]

According to the ITU, 99.3% of Kyrgyzstan's population had access to at least LTE/WiMAX standard in 2023, but as of that year the ITU's data shows that 0% had access to 5G.[280] 5G deployment is chronically delayed, and faces several challenges.[281] At a nominal GDP per capita of $2,400 USD, Kyrgyzstan is Central Asia's second poorest country, and 94% of its area is mountainous, which makes ICT infrastructure—from cables to data centers—both costly and challenging to build.[282] Only 19% of the country's smartphones support 5G, and market analysts believe demand for 5G-enabled services will be slow to emerge.[283] BMI forecasts that 5G may be active by 2025, but may not be widely adopted until as late as 2032.[284]

The Kyrgyz government favors Russian and domestic investors in mobile operators, according to BMI.[285] Megafon, a Russian telecom provider, announced in September 2023 that it would enter the Kyrgyz market. KyrgyzTelecom said it would provide infrastructure in exchange for Megafon's software solutions. An industry analyst told Russian outlet RBC that Megafon would likely develop private LTE and 5G networks for local enterprises.[286]

PRC telecom equipment is widely used. EurasiaNet has reported that leading mobile operators and ISPs such as MegaCom and Saima Telecom have used ZTE or Huawei equipment, including free ZTE equipment given as inter-governmental aid in 2001.[287] Bradley Jardine of the Oxus Society found that Huawei connected 8 out of 10 Kyrgyz residents to the internet in 2019, while in 2018, Silk Road New Observation Network reported that Huawei supplied 90% and 70% of Beeline and MegaCom's equipment, respectively.[288] In 2022, Huawei and MegaCom demonstrated 5G technology in Bishkek, launching two test base stations.[289]

According to a telecom industry expert interviewed for this report, Kyrgyz telecom providers used to work exclusively with Western and Israeli providers in the early 2000s.[290] Ever since Huawei opened its Bishkek branch in the mid-2000s, however, the expert said, "everything is Chinese" pointing to radio relay stations, MSAN multi-switches, and access networks as examples. According to the expert, while Huawei provides the equipment for base stations, Cisco remains the preferred provider for mobile providers' core networks. As noted in the Kazakhstan case study, vendor lock-in may limit Kyrgyz operators' flexibility in shifting providers once infrastructure is in place, and limiting PRC vendors to the network periphery may not offer sufficient protection, as 5G blurs core-periphery boundaries and enables potential data exploitation or disruption.[291]

Satellite Connectivity:

In Kyrgyzstan, satellite broadband is seen as a promising solution for the country's difficult terrain, but market size and regulatory hurdles have slowed adoption. A Kyrgyz digital development expert said in an interview for this

report that Kyrgyzstan's mountains make traditional fiber-optic cable lines prohibitively expensive. Mountains also often block line-of-sight for radio relay systems in remote villages. The expert called top-down satellite connectivity a "game changer," but said providers would likely lose money in Kyrgyzstan's small market. SpaceX has been in talks with the Kyrgyz Government since 2021, and as of March 2024, the Digital Ministry was still in talks with Starlink.[292] In April 2023 , Beeline Kyrgyzstan CEO Andrey Pyatakhin told Kyrgyz outlet Tazabek that the company was working to get French satellite broadband provider Eutelsat OneWeb the proper documentation to operate in Kyrgyzstan following the announcement of OneWeb's partnership with Beeline Kyrgyzstan's parent company VEON in March 2023.[293]

SORM Surveillance Systems:

As in Kazakhstan, Kyrgyz law requires ISPs and mobile service providers to install SORM-compliant equipment.[294] The Kyrgyz government originally acquired this hardware from Russian companies, including Protei, Oniks-Line, and Signaltek, the latter two of which have been accused of maintaining backdoors.[295] The use of these systems not only exposes domestic opposition to state surveillance, but heightens concerns that Russia may have visibility into Kyrgyz communications networks.[296]

Kyrgyzstan and the Data Infrastructure Layer:

- The Kyrgyz government has discussed building government data centers in collaboration with PRC companies.
- The Russian company DataDome has built a data center with Russian government funding that will meet 20% of the country's data storage needs and store confidential government and bank data.

DATA CENTERS IN KYRGYZSTAN:

China in the Kyrgyz Data Center Market:

The Kyrgyz government has regularly engaged with the PRC on data centers, and PRC companies advertise providing data center services in the country. In a May 2021 meeting with the Minister of Investments Promotion [sic], Huawei proposed building a data center to form a unified database for Kyrgyz state agencies and local governments.[297] In December 2023, Kyrgyzstan signed an agreement with China's Center for Promotion of the Industrial Internet of the Silk Road (CPIISP), which was established to promote the DSR in SCO countries. [298] The agreement includes commitments to build data centers and a chip fab, as well as to develop digital government archives and services.[299]

PRC big data company IZP Group, which has been praised by PRC officials for complementing the BRI's logistics supply chain with its network of international data centers, operates a data center in Kyrgyzstan.[300] Hong Kong based Haitu Cloud also maintains a cloud data center in Kyrgyzstan.[301] In May 2023, Chaomu Data, a cloud server distributor brand owned by Shanghai Xunyi Information Technology Co., Ltd., announced it had launched a cloud server in Bishkek.[302]

Russia in the Kyrgyz Data Center Market:

Russian companies and development funds are active in Kyrgyzstan's data center sector, supporting projects tied to government infrastructure and regional integration efforts. In March 2019, Russian company Sitronic signed a joint agreement with KyrgyzTelecom and Megacom to jointly create and operate a data center. As part of the project, the three companies agreed to jointly audit Kyrgyzstan's ICT infrastructure and develop a roadmap for creating data and network infrastructure for government agencies.[303]

In June 2024, Russian company DataDome launched a commercial data center in Bishkek, which will be operated by DataTime, a local data center operator. The project received $1 million from the Russian-Kyrgyz Development Fund (RKDF), established in 2014 by intergovernmental agreement to modernize the Kyrgyz economy as part of "Eurasian economic integration" efforts.[304] The RKDF says the data center will store confidential government and bank data, and meet 20% of the country's data storage needs.[305] RKDF chairman Artem Novikov, Former Deputy Prime Minister of Kyrgyzstan, stated the fund aims to help Kyrgyzstan meet its domestic data storage needs domestically within five years.[306]

The US and EU in the Kyrgyz Data Center Market:

A few Kyrgyz companies are documented using western equipment. Kyrgyz company NSP.kg operates a data center in Bishkek which uses equipment from CISCO, 3CX, Avaya, Polycom, and ORACLE.[307] Kyrgyz company Prohost operates a data center in Bishkek which uses equipment from Intel, Cisco and Mikrotik, a Latvian network equipment provider.[308] The Kyrgyz government continues to engage with Western groups on data centers. For example, in May 2023, Kabar.kg reported that Kyrgyz authorities are in dialogue with Swiss mining company Edelweiss Group AG about building data centers in Kyrgyzstan.[309] In October 2024, the MDD signed an agreement to construct a data center with the Asian Development Bank (ADB).[310] In 2023, ADB's top shareholders were Japan and the United States.[311]

THE CLOUD SERVICES MARKET IN KYRGYZSTAN:

Public details on Kyrgyzstan's cloud ecosystem remain sparse, but a few key developments highlight growing interest from both foreign providers and the state. Google Cloud and AWS are both accessible in Kyrgyzstan. In May 2023, Kaktus media reported that Yandex Cloud would work with MONT, a Russian software distributor, to provide its cloud platform in the Kyrgyz market.[312] The Kyrgyz government's 2024-2028 Digital Transformation Plan calls for a State Data Processing Center (SDPC) and a Government Cloud (G-Cloud) Platform, which will support government agencies and public services.[313] The project is funded in part by the World Bank as part of the Digital Central Asia South Asia (CASA) initiative, which aims to increase affordable internet access and stoke digital development in those regions.[314]

Kyrgyzstan and the Device Layer:

- PRC brands hold a notable minority share of the personal device market in Kyrgyzstan.
- Kyrgyzstan has partnered with PRC companies listed on the US Commerce Department's Entity List to produce Kyrgyz-brand personal devices and network equipment as part of a drive for self-sufficiency.
- PRC equipment providers dominate the provision of facial recognition cameras and IoT devices for "safe cities" programs in Kyrgyzstan, having beat out Russian state-backed competitors.
- Experts suspect these systems transmit data back to the PRC, and Kyrgyzstan has agreed to share facial recognition data with Russian authorities.[315]

PERSONAL DEVICES:

Kyrgyzstan's personal device market is shaped by widespread smuggling, continued reliance on PRC hardware, and new state-led production partnerships with PRC firms—all of which raise concerns about potential backdoors and surveillance risks. Large-scale smuggling of smartphones and other goods from China into Kyrgyzstan leads to significant tax revenue losses and poses regulatory challenges.[316] Analysis of bilateral trade data between China and Kyrgyzstan suggests that most of the trade between China and Kyrgyzstan consists of smuggled goods in the "gray market" in which goods are quasi-legally sold outside of a manufacturer's authorized distribution channels.[317] In response to the influx of these unauthorized devices, the Kyrgyz government mandated in 2022 that mobile devices register their International Mobile Equipment Identity (IMEI) codes, which helps the government track and identify mobile devices for law enforcement and regulatory purposes. The law requires ISPs block unregistered devices.[318]

Gray market sales obscure precise market share, but it is clear from available data that China is a leading provider of personal hardware in Kyrgyzstan. According to StatCounter, the leading mobile phone providers as of September 2024 are Xiaomi, at 38% of the market, followed by Apple (21%) and Samsung (18%).[319] According to OEC data, China also led in personal computers, with a sales volume of $83 million to Kyrgyzstan in 2023, meaning that it held the largest share of that import market (40.6%).[320]

In December 2022, KyrgyzElectronics LLC (Ke.Kg) a subsidiary of state enterprise JSC KyrgyzIndustry, signed an agreement with PRC manufacturer H3C Technologies and Serbian firm Avala Informatika to produce laptops and mobile phones under its own brand, "Meken."[321] The PRC manufacturer H3C's General Director for Russia described the partnership with Ke.Kg as strategic, with both companies aiming to supply state projects and the Digital CASA program, while H3C will also provide training.[322] Ke.kg also produces printers, routers, switches, and network and server equipment, using equipment from PRC firms TelePower Communication, and Pantum International, in addition to HC3.[323] Pantum and HC3 are sanctioned by the United States under the Uyghur Forced Labor Prevention Act and the EAR entity list for supporting PRC military modernization, respectively.[324] Ke.Kg's plant, operational since July 2024, supports the government's push to reduce reliance on imported technology.[325]

INTERNET OF THINGS (IOT) : SMART CITIES IN KYRGYZSTAN

Kyrgyzstan's adoption of foreign-built surveillance systems—primarily from China but also Russia—has expanded nationwide creating inroads for data access, political misuse, and foreign influence. In 2018, Kyrgyzstan launched a bid between Huawei and Russia's Vega Radio Engineering Corporation for a "smart city" initiative. Although Huawei initially won with a proposal to equip Bishkek and Osh with a control center and surveillance cameras, the agreement fell through, and the project was instead awarded to Vega to install traffic cameras.[326] Niva Yau, a non-resident fellow at the Atlantic Council, notes that by July 2019, Vega's facial recognition cameras were used to categorize the movements of individuals and groups of people, as well as for locating cars.[327] Vega, which produces military and surveillance equipment, is a subsidiary of Russian state-owned defense conglomerate Rostec, and its hardware operates on software developed by National Electronics and Export Corporation (CEIEC), a PRC state-owned enterprise sanctioned by the United States for its defense-related activities.[328]

In October 2019, Kyrgyzstan partnered with CEIEC to establish a police command center in Bishkek and install a network of facial recognition cameras, all provided free of charge by CEIEC.[329] According to an expert familiar with the relevant officials, authorities accepted the equipment without understanding how the technology worked, nor how to operate it. Nevertheless, Interior Minister Kashkar Dzhunushaliyev announced plans to install 1,000 cameras throughout Bishkek and eventually expand the system nationwide.[330] PRC companies Hikvision and Dahua—both of which are on US export control lists—have also installed cameras throughout Bishkek.[331] Shenzhen Sunwin Intelligent Co. secured a contract with the Kyrgyz government to install surveillance hardware and software at 306 sites nationwide.[332] As of February 2024, the project remained incomplete after Sunwin had missed the original June 2021 deadline.[333]

The Kyrgyz government is keen to implement these systems nationwide. Kyrgyz media reported that Vega's "smart city" contract expired in September 2024, and the company has agreed to transfer the equipment to the Ministry of Digital Development (MDD).[334] President Japarov later ordered the MDD transfer these systems to the Ministry of Internal Affairs (MIA).[335] In October 2024 the MIA announced that the "safe cities" program would be elevated to the "safe country" program.[336]

Kyrgyz experts have raised concerns over potential PRC access to surveillance data.[337] A June 2023 agreement signed by Russian, Kazakh, and Kyrgyz leaders facilitates the sharing of facial-recognition data and other sensitive identifying information. Within days of that agreement, Russia shared data on 85,000 wanted individuals, enabling Kyrgyz security services to locate, detain, and forcibly repatriate Russian dissidents. [338] For example, Bishkek-based Russian dissident Lev Skoryakin was abducted by security forces in October 2023 and extradited to Russia.[339]

Kyrgyzstan and the Application Layer:

- Whereas the Kyrgyz government has banned TikTok on the grounds that it is harmful to children, Russian platforms like Telegram and VK remain popular alternatives.
- These platforms pose cybersecurity risks due to vulnerabilities exploited by the Russian government, as well as information manipulation risks.
- Kyrgyzstan has signed a joint statement with the PRC seeking assistance in deploying AI and smart solutions in e-government and other areas, creating dependencies that could be exploited for disruption or coercion.

INFORMATION PLATFORMS:

The widespread use of Russian-origin apps in Kyrgyzstan raises concerns about data security, potential Russian surveillance, and disinformation, which is spread most prominently through Telegram.[340] Experts indicate that messenger app preferences in Kyrgyzstan are language-based: Kyrgyz speakers, mainly in rural areas, prefer WhatsApp, which often serves as their primary window to the internet. Russian speakers, primarily urban and educated, tend to use Telegram. In a 2022 Central Asia Barometer study, 91% of Kyrgyz respondents reported WhatsApp as their most used messenger application, while only 5% named Telegram.[341] Telegram founder Pavel Durov has said that half of Kyrgyzstan's population uses the service monthly.[342]

According to a December 2023 media market survey by the research and consulting company M-Vector, the two most popular social media platforms in Kyrgyzstan are Instagram, used by 72% of the population, and TikTok (69%). They are followed by Facebook (32%), VK (10%) and its subsidiary Odnoklassniki (22%), and finally, X (2%).[343] Despite its popularity, TikTok was banned by the Kyrgyz government in April 2024, after the Kyrgyz intelligence services alleged that the platform was harmful to children.[344] In June 2023, Kyrgyz lawmakers passed a law to shield children from "harmful information." Free speech advocates denounced the law as a censorship measure.[345]

SMART APPLICATIONS IN STRATEGIC SECTORS:

The PRC has supported Kyrgyz development efforts through cooperative agreements, investments, and technology transfers in manufacturing, biotechnology, e-commerce and e-governance. Ahead of the SCO summit in Astana in July 2024, PRC Leader Xi Jinping and Kyrgyz President Japarov pledged closer cooperation facilitating technology transfers and investments from China to Kyrgyzstan.[346] That same year, a PRC biotechnology company announced plans to build a vaccine plant in Kyrgyzstan, which included transferring advanced technologies and training local specialists.[347]

In February 2025, PRC Leader Xi Jinping and President Japarov signed a joint statement in Beijing that pledged to deepen the "China-Kyrgyzstan comprehensive strategic partnership in the new era".[348] The two sides agreed to several areas of cooperation, including the digital economy, AI, and PRC assistance for Kyrgyzstan's judicial

information system.[349] Details on these initiatives are scarce, but public reporting has shed light on collaborations in e-commerce and e-government.

E-Commerce: PRC consumer-facing apps have limited popularity in Kyrgyzstan, with the exception of Alibaba, which competes with incumbent Russian providers such as Wildberries.[350] In September 2023, Deputy Chairman of the Kyrgyz Cabinet of Ministers Edil Baisalov expressed interest in strengthening ties with Alibaba during a visit to its headquarters. The parties discussed improving delivery times, using Alibaba's platform to sell Kyrgyz-made products in China, the possibility of Alibaba playing a role in Kyrgyzstan's public procurement processes, and facilitating direct access to PRC manufacturers.[351]

E-Government: The Kyrgyz government's 2024-2028 Digital Transformation Plan aims to digitize government services and centralize their administration and data storage.[352] Tunduk, an e-government platform Kyrgyzstan launched in 2018, is based on software from the Estonian government's X-Road system. The platform is charged with providing public services, and with coordinating interagency data management.[353] As discussed earlier in this report, the Kyrgyz government has signed agreements with Russian and PRC entities to cooperate on both data storage and digital government services, so these systems may be exposed to security risks.

Kyrgyzstan and the Governance Layer:

- Unlike Kazakhstan and Uzbekistan, Kyrgyzstan does not have data localization laws, nor centralized state control over its digital infrastructure.
- Deepening a trend that pre-dates the Japarov administration, the government has directly copied Russian laws governing cyberspace and civil society, and both former and current Kyrgyz officials have noted the informal power that Russian security forces wield in the country.[354]
- Kyrgyz officials have praised China's development model as being "suitable" for Kyrgyzstan,[355] and cooperative agreements between Kyrgyzstan and the PRC feature technical exchanges and trainings on digitally enhanced policing techniques.

DIGITAL AUTHORITARIAN NORMS AND PRACTICES:

Despite Kyrgyzstan's post-independence history as Central Asia's island of democracy, the country is increasingly adopting authoritarian norms and practices common throughout Central Asia. These include security cooperation with the PRC and training in digital policing techniques. Its Interior Ministry increasingly engages with Russian and PRC counterparts to adopt tools and tactics for surveillance and social control.

Global Governance and Norms: Kyrgyzstan has worked with Russia and China to promote digital authoritarian governance norms, participating in the 2015 SCO proposal to the UN on the "International Code of Conduct for Information Security" which was outlined in the Kazakhstan case.[356]

Election Systems: Russia has lent significant technical and political support to the Japarov administration. An August 2024 investigative report by Kloop found that Russian political technologists connected with Yevgeny

Prigozhin and the Wagner Group were involved in running Japarov's presidential campaign in 2020.[357] In June 2024, Nurzhan Shaildabekova, chairwoman of Kyrgyzstan's Central Election Commission said that Kyrgyz authorities had studied Russia's use of electronic voting systems and decided to pilot them across the country, raising concerns among democratic observers that the vote could be manipulated in the ruling party's favor.[358]

Trainings and Exchanges: PRC entities have shared best practices on internal security with the Kyrgyz government. Between 2003 and 2016, the Kyrgyz military held 10 exercises or trainings with PRC security forces. In 2019, Kyrgyzstan's National Guard trained on counterterrorism with China's People's Armed Police, a paramilitary organization under China's Central Military Commission, tasked with internal security, including suppression of populations in Xinjiang and Tibet.[359] In June 2023, a delegation of the Kyrgyz Interior Ministry participated in a training in Xinjiang, in which PRC officials oversaw exercises in crowd control and "anti-terrorist" crackdowns. This included studying the use of unmanned aerial vehicles and the digitalization of the PRC police forces.[360] Kyrgyzstan's Interior Ministry participated in the first meeting of Central Asia's Ministers of Internal Affairs and the PRC's Ministry of Public Security in September 2024.[361] Kyrgyz officials also regularly participate in the CIS Council of Ministers of Internal Affairs, a Russia-led forum where interior ministries coordinate on protest management and share tactics for suppressing unrest.[362]

Kyrgyzstan's technology companies have also participated in trainings and exchanges organized by PRC entities. In June 2024, Huawei held a commercial roadshow in Bishkek, which featured training sessions provided by Huawei on IP networks, data storage, and Huawei's IT platforms support services.[363] The Director of Kyrgyzstan's High Technology Park, a government-supported tech incubator, gave a presentation at the November 2023 Central Asia Regional Economic Cooperation (CAREC) Program Innovation Week and Digital Economy Tour in Hangzhou, China, highlighting opportunities for closer cooperation with China's tech sector.[364]

LAWS AND REGULATIONS:

Kyrgyzstan has adapted, and sometimes directly copied, Russian legislation controlling civil society and online spaces. Not all of these laws and regulations touch directly on the digital sphere, but they have had the cumulative effect of expanding the Kyrgyz government's ability to monitor its citizens, regulate their speech, and reduce the ability of domestic and foreign observers to assess the country's digital sector and practices.

Kyrgyzstan's **Law on Personal Data**, passed in 2008, stipulates that the government cannot collect personal data without consent, and that corporations may only transfer personal data after receiving permission from state authorities. The law further bans data transfer to countries that do not have "adequate levels of protection", but does not define what that entails. In a 2021 report for Harvard's Davis Center, Cian Stryker argues that despite being robust on paper, Kyrgyzstan's data protection laws are weak in practice. This is due to poorly defined legislative requirements and to the fact that government officials do not follow the letter of the law. One example is a scandal in 2017 when it was revealed that then-presidential candidate Sooronbai Jeenbekov had surreptitiously used private citizen's data hosted on government servers to advantage his campaign.[365]

Russia remains a strong influence on Kyrgyzstan, with Kyrgyz leaders sometimes directly copying Russian legislation. In 2019, Ed Lemon, President of the Oxus Society, used plagiarism software to compare Russian and Central Asian laws and found that 79 percent of Kyrgyzstan's laws on terrorism and extremism were copied from the corresponding Russian laws.[366] Kaktus Media, a Kyrgyz news outlet, has identified several instances in which Kyrgyz legislators have attempted to plagiarize Russian laws, including a draft Law on Mass Media, which one Kyrgyz lawmaker noted was almost entirely copied. The draft law was withdrawn in March 2024 to be adjusted and considered at a later time.[367] In May 2020, Factcheck.kg revealed that a draft law targeting misinformation copied language from Russian legislation.[368] Passed in August 2021 as the "Law on Protection from Inaccurate (False) Information", it allows the government to block websites with content it deems false or defamatory.[369] It was used to target outlets such as RFE/RL in 2022 and Kloop in 2023.[370] While RFE/RL's Kyrgyz service was unblocked by court order in July 2023, the foundation supporting Kloop was liquidated as a result of the government's lawsuit, and Kloop's website remains blocked in Kyrgyzstan.[371]

In April 2024, Kyrgyzstan adopted its own version of Russia's Foreign Agents Law, taking language from the original legislation.[372] The law requires that NGOs which receive funding from abroad register with the government, and be subject to annual audits and reporting. The law also imposes penalties, including up to ten years in prison, for involvement in NGOs accused of inciting citizens to "shirk civic duties" or "engage in unlawful acts".[373] The OSCE warned in February 2024 that the law "would have an overwhelmingly negative impact on civil society, human rights defenders, and the media in Kyrgyzstan".[374] According to Human Rights Watch, the law has indeed fostered self-censorship and resulted in the closure of NGOs.[375]

Uzbekistan and the Technology Stack:

Of the three case study countries, Uzbekistan is the most exposed to PRC influence at the data infrastructure layer but also shows key vulnerabilities across all other layers. Huawei-built data centers supporting e-government services run entirely on Huawei Cloud Stack, creating long-term dependencies and risks of PRC access, coercion, or disruption. Uzbekistan's application layer vulnerabilities are also significant, as Telegram dominates the information platform ecosystem despite security risks, while PRC smart solutions providers play a major role in sectors like biotechnology, computer hardware, and e-government. Like its neighbors, Uzbekistan relies on Russian-controlled fiber optic routes and PRC telecom equipment, heightening risks of disruption and espionage. Russian influence is particularly strong in the governance layer, with many Uzbek cyberspace and civil society laws modeled on Russian legislation, while both Russian and PRC entities provide key ICT training.

Uzbekistan and the Network Infrastructure Layer:

- Just as Kyrgyzstan, Uzbekistan relies on high-bandwidth fiber-optic connectivity running through Kazakhstan and Russia. This leaves Uzbekistan vulnerable to espionage as well as internet disruptions of either a coercive or technical nature originating upstream.
- PRC vendors such as Huawei are key providers of Uzbekistan's network equipment, particularly at the network edge, posing espionage risks.
- Russian SORM surveillance systems, which could include backdoors, are mandated for ISPs.

TERRESTRIAL CABLES AND INTERNET TRAFFIC ROUTES:

Uzbekistan relies exclusively on a single fiber-optic cable line for its national backbone and high-bandwidth international connectivity, which forms part of the Transit Europe-Asia (TEA) terrestrial cable network. This line connects Uzbekistan with neighboring Kazakhstan and Turkmenistan,[376] and the country has additional terrestrial cable connections to neighboring Kyrgyzstan, Tajikistan and Afghanistan.[377]

Uzbekistan relies heavily on upstream connectivity through Kazakhstan and Russia, with a 2020 RIPE NCC analysis showing that most of its upstream providers are registered in these two countries.[378] In 2023 RIPE NCC also found a particularly high dependence on the autonomous system (AS)[379] of Russian telecom company Kvant-Telekom for outside connectivity, and that a significant amount[380] of Uzbek traffic bound for Kazakhstan is routed through ASes registered in Russia, the UK, and Hong Kong.[381] These dependencies and inefficient routing paths, lead to significant delays and make Uzbek internet traffic vulnerable to surveillance and disruptions, whether technical or political.[382] Regional initiatives like the Trans-Caspian Fiber-Optic Cable could offer Uzbekistan an opportunity to diversify its upstream routes and reduce its vulnerability to Russian chokepoints.[383]

Uzbekistan relies on a single major fiber optic route

Figure 8
Source: ITU Infrastructure Connectivity Map

Uzbekistan's Network Monopolist

Uzbektelecom (also known as Uztelecom), Uzbekistan's state-owned telecommunications monopoly, owns more than 95% of the country's fiber-optic backbone, dominates the fixed broadband market, and sells internet access to domestic internet service providers (ISPs).[384] It also operates the international packet switching center—the sole gateway for all international traffic—enabling government control over access to international networks and surveillance of internet traffic.[385] In June 2024, President Shavkat Mirziyoyev issued a decree to align regulations with WTO standards as part of Uzbekistan's membership bid. [386] This included an "experimental" measure allowing Uzbek ISPs and telecom operators to forgo routing their internet traffic through the international packet switching center and connect directly to international networks provided they meet the country's requirements regarding intelligence-gathering, information, and cyber security systems.[387]

UzTelecom has built out the country's national fiber-optic cable networks in line with the Digital Uzbekistan 2030 Strategy.[388] The strategy's plans included expanding internet coverage by growing the network from 24,500 kilometers in length in 2018 to 227,000 kilometers in 2023.[389] According to the ITU, fixed broadband subscriptions in Uzbekistan grew from 14 to 30.3 per 100 people between 2018 and 2023, while internet access expanded from 55.2% to 89% of individuals during the same period.[390] According to USAID, the Japan Bank for International Cooperation (JBIC) provided a $138.5 million loan for the build out, whereas discussions with the World Bank and the EBRD to support the initiative have not borne fruit.[391]

The sourcing of Uzbekistan's fiber-optic cable and network equipment is diverse. According to Abbos Bobokhonov, the Head of the Indo-Pacific Studies Center at the University of World Economy and Diplomacy in Tashkent, the Uzbek government is committed to balancing its portfolio of vendors, and so has worked not only with ZTE and Huawei, but also with companies such as South Korea's KT Corporation and LG CNS, Japan's NEC Corporation, as well as the Netherlands' Veon, and Nokia from Finland. According to anonymous interviews carried out by Bobokhonov, the Uzbek government limits the use of PRC ICT equipment in critical infrastructure, using European equipment instead.[392] As noted in the Kazakhstan and Kyrgyzstan case studies, vendor lock-in may limit Uzbek operators' flexibility in shifting providers once infrastructure is in place, and limiting PRC vendors to the network periphery may not offer sufficient protection, as 5G blurs core-periphery boundaries and enables potential data exploitation or disruption.[393]

According to Bobokhonov, PRC entities often make non-disclosure a condition of cooperation for digital infrastructure projects, but evidence can be found in public reporting and statements.[394] USAID identified Huawei as a major supplier of network equipment in a 2022 report.[395] Following the April 2019 Belt and Road Forum, during which Uzbek President Mirziyoyev met with PRC Leader Xi Jinping in Beijing, a bilateral working group was established to upgrade Uzbekistan's networks.[396] These include a $1 billion agreement with Huawei and a subsidiary of CITIC Group to build out digital infrastructure, and a $150 million loan from China's Export-Import Bank to modernize the equipment of state-run mobile network operator Mobiuz, including 48,800 meters of fiber-optic cable lines.[397]

In June 2024, China, Kyrgyzstan and Uzbekistan agreed to build a railway line connecting the three countries. The project, financed largely by China, involves the creation of a joint venture based in Kyrgyzstan.[398] The PRC will hold 51% of the shares, while Uzbekistan and Kyrgyzstan will each hold 24%. The construction is carried out by China Railway International.[399] At the Fifth China-Central Asia Foreign Ministers' meeting in Chengdu, Uzbekistan and China agreed to strengthen cooperation on connectivity, including both transportation and optical cables, suggesting that fiber-optic cables may be deployed alongside infrastructure projects supported by Beijing.[400]

Multiple experts interviewed for this report noted that the co-deployment of physical and digital infrastructure projects is a common infrastructure development practice. Many countries, including the United States and EU member states, have policies to encourage construction and public works projects to install or lay the groundwork for fiber-optic cables and other essential infrastructure alongside roads, railways, and utilities to reduce future costs and disruptions. As discussed earlier in this report, Kazakhstan's national railway company has deployed Huawei-provided fiber-optic cables along its rail network.[401]

Uzbek officials have sought guidance from the UN on the implementation of ICT infrastructure co-deployment practices. The UN Economic and Social Commission for Asia and the Pacific (ESCAP), a sustainable development platform, has provided training and resources to encourage the integration of ICT with energy and transportation infrastructure in Central Asia. Uzbekistan's Ministry of Higher Education, Science, and Innovation has collaborated with ESCAP to identify potential corridors and conduct feasibility studies using ESCAP's tools and expertise.[402] At a June 2024 ESCAP Working Group meeting in Bishkek, a consultant highlighted the China-Kyrgyzstan-Uzbekistan rail corridor as a candidate for fiber-optic co-deployment.[403]

MOBILE NETWORKS:

Uzbekistan's telecommunications sector is shaped by a mix of state ownership, heavy PRC and Russian involvement in infrastructure development, and emerging—but limited—Western engagement. Uzbekistan's mobile market comprises six operators, including the three state-owned companies **UCELL** at 25% of the market, **Mobiuz** (22%), and **Uzmobile** (23%), alongside private operators **Beeline** (25%), **HUMANS** (4%), and **Perfectum Mobile** (1%).[404] According to a 2022 USAID report, Mobiuz received a license to connect to the international internet without going through Uztelecom's gateway, but has not operationalized this connection. Beeline, owned by Dutch company VEON, has been repeatedly denied such a license.[405]

According to the ITU, 92% of Uzbekistan's population had access to at least LTE/WiMAX standard connections in 2023, but only 18% had access to 5G.[406] According to a 2022 USAID report on Uzbekistan's ICT sector, 5G networks were being tested in Tashkent and other major cities, while 4G and even 3G remained widely used across the country.[407] Huawei, which maintains partnerships with all of Uzbekistan's key mobile providers, leads much of the infrastructure deployment.[408]

PRC firms have played a significant role in modernizing Uzbekistan's telecommunications network. Between 1997 and 2008, Huawei modernized Uzbekistan's mobile networks in a $21.2 million project, partly financed by the China Development Bank, and later signed another $18 million agreement in 2011.[409] Following President Mirziyoyev's visit to Huawei's Research and Innovation Center as part of the Belt and Road Forum in April 2019, China's Export-Import Bank financed the construction of 2,800 4G base stations and 1,800 radio relay lines for Mobiuz. [410] Leading up to the SCO summit in Samarkand in 2022, Uztelecom signed $506.8 million in contracts with Huawei and ZTE to install and modernize thousands of 3G/4G base stations and introduce 388 new 5G standard base stations.[411] In February 2024, Teletimes, an outlet that covers the ICT sector in the Middle East, Africa and Asia, reported that UCELL, a leading Uzbek telecom provider, had spent $247.8 million over two years to enhance its networks, including Huawei equipment.[412]

In May 2023 President Mirzoyoyev and PRC Leader Xi Jinping signed an agreement to cooperate on the expansion of Uzbektelecom's telecommunications infrastructure.[413] In September 2024, Uztelecom announced the launch of non-standalone 5G services, supported by more than 3,500 5G base stations.[414] In the same month, Uztelecom announced that it had launched a 5.5G standard network in collaboration with Huawei as a part of the ICT Week Conference in Tashkent.[415]

Russian companies maintain significant ownership stakes over UCELL, one of Uzbekistan's leading providers. Between 2021 and 2023, Russia's third-largest telecom operator **Megafon** held a 51% controlling stake over UCELL through a joint venture called **Digital Holding**, formed with the Uzbek government, which held the remaining 49%.[416] The venture granted Digital Holding key privileges, including direct contracting with government agencies without tenders and automatic land allocation for base stations.[417] In October 2021, Ivan Streshinsky, CEO of Megafon's Russian parent company USM Holdings stated that Megafon aimed "to invest a lot of Megafon money in developing [Uzbekistan's] communications infrastructure".[418]

Megafon later sold its controlling stake in Digital Holding to its parent company **USM Holdings** in February 2023.[419] The sale placed UCELL, one of Uzbekistan's largest telcos, directly under the control of USM Holding's owner, Alisher Usmanov, an Uzbek-born Russian oligarch sanctioned by the EU and the United States for supporting Russia's invasion of Ukraine.[420] When the EU imposed sanctions on Usmanov in February 2022, the European Council described him as "one of Vladimir Putin's favorite oligarchs".[421] The US Office of Foreign Assets Control (OFAC) characterized Usmanov as having close personal relationships with several senior Russian officials, and said that he had used his vast business and financial holdings to circumvent sanctions.[422] Usmanov also has personal ties to the Uzbek leadership in Tashkent, as his nephew was once married to President Mirziyoyev's niece.[423]

Russian analysts have framed USM Holding's acquisition of Megafon's stake in Digital Holding as a business decision. According to Artem Mikhaylin, a Russian financial analyst interviewed by Forbes Russia, USM "plans to keep the Uzbek asset for itself and develop it independently", potentially preparing for a future sale, as "Russian telecommunications companies are not very interested in their foreign assets". [424] However, given Usmanov's close relationship to the Kremlin, the move may also serve broader Russian strategic interests. A Kazakh think tank researcher interviewed for this report noted a similar pattern in Kazakhstan in which Kazakh oligarchs with significant business ties to Russia controlled or acquired ownership stakes in strategic sectors.[425] "This makes it difficult for Kazakhstan to put controls on key industries and protect them from foreign influence", the researcher explained, suggesting that such acquisitions could serve as a means of maintaining Russian economic leverage in the region.

Western firms also play a small role in Uzbekistan's mobile networks through Perfectum, which has only 1% market share as of December 2023.[426] In April 2024, Nokia announced a deal with Uzbek provider Perfectum to build a completely new end-to-end 5G standalone solution in Uzbekistan.[427] The two-year deal was approved by the Uzbek Ministry of Digital Development, and is funded by both western and Uzbek banks.[428] In August 2024, multiple media outlets, reported that UK-based Vodafone and a UAE-based telecom company called e& [sic] would also be involved in Perfectum's 5G roll out.[429]

SATELLITE CONNECTIVITY:

Western companies are the most prevalent providers of satellite broadband in Uzbekistan, though it should be noted that because it is illegal for private ISPs to bypass Uztelecom's international packet switching center, end users may be prohibited from freely contracting with these providers if those providers have not put in place measures to comply with Uztelecom's monopoly on international connectivity.[430] In October 2022, The Uzbek government met with representatives from SpaceX's Starlink and Eutelstat's OneWeb in Tashkent, seeking to bring their satellite broadband services to Uzbekistan, and advocating for those companies to open offices in the country.[431] Shukhrat Kadirov, the head of the Uzbek space agency Uzbekcosmos told Gazeta.uz in February 2023 that OneWeb satellite broadband already covered all of Uzbekistan. In December 2023, Daryo.uz reported that Starlink's launch in Uzbekistan had been delayed to 2025.[432] In June 2024, Luxembourgish company SES signed

a deal with UZ-SAT, Uzbekistan's national satellite provider, to deliver connectivity services through SES's GEO satellite, NSS-12, particularly targeting remote areas underserved by terrestrial networks.[433]

Apart from these partnerships, Uzbekistan has engaged a wide variety of alternative providers of space-based connectivity services, including those from the PRC. In May 2022, Uzbekcosmos co-hosted a space technology conference with British company Dialogue Events Ltd.in Tashkent.[434] Attendees included representatives from the space programs of Kazakhstan, Turkiye, Azerbaijan, and the UAE, as well as private space companies like SpaceX, OneWeb and China's HEAD Aerospace Group, which provides remote sensing and satellite-based IoT services.[435] Uzbekistan signed a number of cooperative agreements following the conference, including a September 2022 agreement with HEAD to cooperate on remote sensing and the IoT industry, signaling that the PRC's space-based offerings are seen as a viable and competitive alternative for certain applications within Uzbekistan's growing satellite sector.[436]

SORM SURVEILLANCE SYSTEMS:

Uzbek law requires that ISPs and mobile providers install SORM-compliant equipment.[437] The Uzbek government originally acquired this equipment from Russian companies, including VAS Experts, Protei, and MFI-Soft, Speech Technology Center and Oxygen Software.[438] The use of these systems not only exposes domestic opposition actors to state surveillance, but heightens the probability of Russian access to Uzbek communications networks.[439] PRC firms have updated aging SORM equipment in Uzbekistan, which raises similar concerns.[440]

Uzbekistan and the Data Infrastructure Layer:

- Of the three case study countries, Uzbekistan is the most exposed to PRC influence at the data infrastructure layer, because Huawei built the data center supporting the country's e-government services. The country's national cloud system operates out of the same facility and is run entirely on Huawei Cloud Stack. This exposes sensitive public data and services both long-term dependency and risks of PRC access, coercion, or disruption.

DATA CENTERS AND CLOUD SERVICES

Uzbekistan's data infrastructure development is driven by partnerships with foreign vendors—most prominently Huawei—positioning PRC technology at the core of the country's national cloud. Following President Mirziyoyev's April 2019 visit to China the State Development Bank of China agreed to provide a $40 million loan to upgrade Uztelecom's networks and introduce 5G, as well as to expand data storage and processing centers.[441] Even prior to that, Huawei had already built a data center for Beeline Uzbekistan.[442]

In August 2022, Uzbekistan launched the Unified Data Storage and Processing Center in the Tashkent region as part of the Digital Uzbekistan 2030 program to build large scale data processing capabilities.[443] The 20-petabyte

data center was set up jointly with Huawei, and it is the single facility supporting the country's e-government system.[444] Speaking at the Eurasian Data Center and Cloud Forum in March 2022, Daniel Zhou, president of Huawei's Eurasia region, characterized the project as a "national data center", which would serve as an example for other countries.[445] The national cloud, Uzbekistan Cloud, operates out of this facility, and runs entirely on Huawei Cloud Stack.[446] According to Huawei Cloud, the company also provides multi-level virtual data centers matching the structure of Uzbek ministries and is thus able to serve 4.5 million users in Uzbekistan.[447]

Uzbekistan has also discussed data infrastructure projects with Tencent and ZTE. In January 2024, Daryo.uz reported that the Uzbek government discussed a potential collaboration with Tencent Cloud International.[448] In June 2024, Uzbekistan's Digital Minister met with the Senior Vice President of ZTE and discussed potential collaboration in data center initiatives, in addition to the company's existing remote-business outsourcing center at Uzbekistan's IT Park.[449]

Apart from PRC companies, Uzbekistan has discussed data infrastructure projects with companies from Russia and from democratic countries. The 2021 agreement to establish Digital Holding, the Russian-Uzbek joint venture that owns Uzbek telco UCELL, outlined plans to implement information security and data storage systems in the Uzbekistan.[450] Uzbektelecom also works with Japanese companies on the cloud platform for data centers in Tashkent, Bukhara, and Kokand, as well as with East Telecom, a subsidiary of Korea Telecom Corporation that plans to build a data center in Tashkent.[451] At the May 2023 Uzbek-German business forum, Uzbekistan's Digital Ministry signed an MOU with AWS, seeking input on digitalization strategy and best practices.[452]

Uzbekistan and the Device Layer:

- At the device layer, PRC brands Honor and Xiaomi hold 30% of the smartphone market according to Statista, though many devices enter the country through cross-border smuggling, making it difficult to track market share or enforce security standards.
- The prevalence of PRC-origin devices also raises concerns about potential backdoors and other security vulnerabilities that could expose users to surveillance risks.
- As in Kazakhstan and Kyrgyzstan, PRC equipment providers are the leading providers of facial recognition cameras and IoT devices for "safe cities" programs, and experts suspect these systems transmit data back to the PRC.

PERSONAL DEVICES

As in Kyrgyzstan, Uzbekistan's personal device market is marked by pervasive gray market imports and a dominant PRC hardware presence—raising persistent concerns about surveillance risks and potential backdoors, even as the government takes steps to regulate and monitor device usage. Large-scale smuggling of smartphones and other goods from China into Uzbekistan leads to significant tax revenue losses and poses regulatory

challenges.[453] Government statistics indicate that 87% of mobile devices in Uzbekistan in 2019 were smuggled into the country through the gray market.[454] The influx of these unauthorized devices undermines government efforts to monitor and control the telecommunications sector. To address this issue the government mandated in 2019 that mobile devices register their IMEI codes, which helps track and identify mobile devices for law enforcement and regulatory purposes.[455] The law requires ISPs to block unregistered devices.[456]

Gray market sales obscure precise market share, but it is clear from available data that China is a leading provider of personal hardware in Uzbekistan. Government statistics show that most legally sold "white market" mobile devices in 2022 were imported from China, amounting to 1.6 million devices.[457] According to Statista, the leading smartphone providers in Uzbekistan as of April 2024 were Apple (27%), Samsung (15%), and PRC brands Honor (20%) and Xiaomi (10%).[458]

INTERNET OF THINGS (IOT): SMART CITIES IN UZBEKISTAN

Uzbekistan's "safe cities" program has relied heavily on PRC surveillance technology from the outset, embedding PRC-linked systems across public security infrastructure—even as implementation has faced persistent setbacks. The program was launched in three stages beginning in 2017. That same year, President Mirziyoyev announced that the program would be extended from Tashkent to the entire country by 2023.[459] In January 2019, the Uzbek Cabinet of Ministers issued a framework to implement "smart" IoT technologies and advance the "smart cities" concept in the country, identifying the Safe Cities surveillance program as one of several pilot projects alongside initiatives in smart transport, smart meters, smart medicine, and others.[460]

In July 2018, Uzbek officials, led by Minister of Internal Affairs Polat Bobojonov, visited the Ministry of Public Security of China to study its practices, with a particular interest in facial recognition technology (FRT) to identify wanted individuals in large crowds. The two sides signed an MoU to adopt these ICT solutions in Uzbekistan.[461] The same month, Huawei agreed to install a "safe tourism" pilot project in Bukhara with a command center, facial-recognition cameras, an LTE network, and a dedicated data center.[462]

The Uzbek government signed a larger agreement with CITIC Group, a state-owned PRC investment company, and COSTAR Group, a PRC optics company, in June 2019 to launch the first stage of the Safe Cities program in Tashkent, utilizing Huawei technology. [463] These PRC firms committed $300 million to the pilot, which included installing over 880 traffic monitoring cameras, with plans to scale their investment up to $1 billion by the end of 2020.[464] The Uzbek government has since applied PRC surveillance technology broadly. Huawei and ZTE have supplied video surveillance for Uzbek schools, patrol buses equipped with 360-degree intelligent FRT cameras to identify citizens, and AI-driven traffic monitoring across the country. [465] The government has also used "Promobot", a Russian surveillance robot, for security in Tashkent stores.[466]

In its second stage the Safe Cities program planned to expand to additional major cities by the end of 2021.[467] A January 2022 USAID report on Uzbekistan's digital sector described the program as having stalled.[468] In March 2024, the Uzbek media outlet NOVA24.uz acknowledged the program's role in solving individual criminal cases but highlighted significant implementation shortcomings. The Ministry of Internal Affairs confirmed that only 7,000 of the 16,000 cameras planned for Tashkent had been installed. In Samarkand, poor-quality cameras failed

upon activation or were inoperative.[469] At the same time, NOVA24.uz also reported ongoing implementation of Safe City systems in Termez, Khiva, Chirchik, and Kokand.[470]

Beyond this program, PRC companies dominate Uzbekistan's video surveillance and security markets, with brands like Hikvision, Dahua, HiWatch, and Space Technology accounting for approximately 95% of the market, according to Abbos Bobokhonov. Bobokhonov's research highlights the widespread use of Hikvision equipment by both government and corporate entities. Setko Company, a Hikvision distributor, supplies government clients such as the Ministry of Defense and the Central Bank of Uzbekistan. According to Bobokhonov, private firms like Nestle, Carlsberg, and Orient Finance Bank, and state-owned enterprises like Uzbekistan Airways, also use Hikvision equipment in Uzbekistan.[471]

Uzbekistan and the Application Layer:

- At the application layer, Uzbekistan faces the highest cybersecurity and information manipulation risks from Telegram among the three case studies, as the platform dominates the country's information platform landscape and is used by government officials.
- Uzbekistan has also developed partnerships with PRC smart solutions providers in a wide variety of industries, including biotechnology, electric vehicles, semiconductors, computer hardware, agriculture, e-government, and more, creating dependencies that could be exploited for disruption or coercion.

CONSUMER APPLICATIONS AND INFORMATION PLATFORMS:

According to Freedom House, the Uzbek government censors online speech extensively, monitors domestic digital communications, and routinely blocks websites. Uzbekistan's Center for Mass Communications monitors the web for illegal content, which it flags to be blocked.[472] In late 2020 and early 2021, the government imposed harsh penalties for undesirable online speech, and has regularly imprisoned bloggers, journalists, and social media commentators, among others.[473] In July 2021, the government blocked Skype, Twitter, TikTok, VKontakte, and WeChat for being out of compliance with the personal data law, which requires that internet companies store the personal data of Uzbek users on servers physically in the country.[474] These platforms were unblocked in August 2022, though TikTok remains blocked and accessible only by VPN.[475]

Telegram is Uzbekistan's most popular messaging and social media platform. A 2022 Central Asia Barometer study found 71% of Uzbeks reported Telegram as their most used messenger application. WhatsApp was only favored by 18%, and the government has periodically blocked the Signal app. [476] Experts typically consider both of these apps more secure than Telegram.[477] Government officials, including in the President's Office, use Telegram as a tool for public outreach.[478] The service's prevalence in the country, despite well-documented security issues noted earlier in this report, creates risks of data breaches as well as potential Russian surveillance and disinformation, especially given that more than half of Telegram users in Uzbekistan trust information received through the platform, according to Uzbek market intelligence firm Insight Business.[479]

SMART APPLICATIONS IN STRATEGIC SECTORS:

The Uzbek government's cooperation with China extends beyond surveillance to smart applications in strategic sectors.[480] In May 2023, President Mirziyoyev and PRC Leader Xi Jinping signed 41 agreements, including plans for an Uzbek-Chinese agro-industrial park, a biotechnology cluster, and PRC EV production in Uzbekistan.[481] Writing in the People's Daily in January 2024, Mirziyoyev said that "development of multifaceted relations with China has been and remains one of the main priorities of Uzbekistan's foreign policy." He wrote that PRC partners would participate in major water, energy, and infrastructure projects, and that it was important for two sides to strengthen "industrial cooperation and expand "the transfer of digital and green technologies."[482]

Advanced Technology Manufacturing: Uzbekistan is home to a growing number of manufacturing facilities established by PRC companies, as well as Uzbek-Chinese industrial joint ventures, in areas including biotechnology, electric vehicles, semiconductors, and computer hardware. In February 2024 Uzbek officials in the Andijan region reached a $3 billion deal with Chinese investors to produce complex drugs and medical products in the region.[483] In June 2024, PRC company MingYuan Silu Industry began building a $1.2 billion technology park in Uzbekistan's Jizzakh region, funded by Chinese investors.[484] That same month, President Mirziyoyev visited BYD's $160 million factory in Jizzakh, which has the capacity to produce 50,000 electric vehicles a year, and plans to expand capacity to 300,000 a year.[485] In December 2023, the Tashkent regional government reached an agreement with China's Dezhou City to construct a $1 billion state-of-the-art PRC microchip plant in Chirchik.[486] In January 2024, Daryo.uz reported that Uzbekistan's Kashkadarya Region reached an agreement with Shenzhen-based T.D.S. Electronic Technology and US-based Intel to open a plant for manufacturing computer hardware. The project will employ 120 workers, trained locally and in China, to support domestic technology production with technical expertise.[487]

Smart City Applications: In May 2023, Uzbekistan's Agency for Innovative Development presented its GIS Innovation project in Tashkent, a collaboration with China's SuperMap Software Co. Ltd., which specializes in geographic information systems for urban development and smart cities. The project had been announced at the China-Central Asia summit in Xi'an earlier that month.[488] In November 2023, PRC companies Chengdu Shiny Technology and Zhiyuanhui Information Technology met with regional Uzbek officials to discuss implementing smart transportation, energy, water and gas utility systems as part of Ferghana's Smart City initiative.[489] In July 2024, Daryo.uz reported that US property developer C&N associates had announced plans to build a $10-15 billion smart city in Nurafshan. This new urban area would house numerous government entities, medical institutions, educational facilities, industrial zones, and technology parks. The plan also includes a high speed rail connection between Nurafshan and Tashkent.[490]

Smart Agriculture: In 2021, Huawei implemented a 5G-based smart agriculture project to monitor and manage crops in collaboration with Uztelecom and the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers.[491] In February that same year, the Jizzakh Organic Cluster began operating drones to map and monitor land, crops, and vegetation, provided by the PRC company FOXTECH.[492] At an event hosted by the Uzbek Embassy in Beijing, PRC company Dayu Irrigation Group signed a memorandum of cooperation with the Ministry of Agriculture to deliver smart irrigation services in January 2024.[493]

E-Government: According to a 2022 USAID report, China has supported the Uzbek government's Digital Archive project. In March 2022, the PRC Ministry of Commerce and the Uzbek Ministry of Investment and Foreign Trade committed to the joint development of a shared cloud platform supporting bilateral investment monitoring.[494] According to USAID, Uzbek e-government initiatives have also been supported by the Korean-Uzbek Center for e-Governance Cooperation, as well as the Estonian government and the German Society for International Cooperation, primarily for training and technical guidance.[495]

Digitally Enhanced Transportation and Logistics: In March 2023, China Machinery Engineering Corporation (CMEC) signed an agreement with the Uzbek State Committee on Roads to deploy a "smart highway" solution along the A380 highway, a strategic road partially funded by the EBRD to connect Uzbekistan to Europe.[496] "Smart highways" integrate IoT sensors, AI-driven traffic management and real-time data analytics to improve road safety and efficiency for both human-driven and autonomous vehicles.[497] In January 2024, an Uzbek delegation from a subsidiary of Uzbekistan Railways and the Ministry of Transportation met with the chairman of the PRC company Jiayou International and discussed implementing digital solutions in the management of warehouses and logistics centers along the China-Kyrgyzstan-Uzbekistan railway.[498]

Uzbekistan and the Governance Layer:

- Uzbekistan has "adopted elements of China's restrictive cyber governance regime," according to the US-China Economic and Security Review Commission's 2023 Report,[499] though Russia's influence also remains strong.
- Uzbekistan draws selectively from both China's and Russia's digital governance strategies, in some cases adopting practices entirely, adapting them to local realities.[500]

DIGITAL AUTHORITARIAN NORMS AND PRACTICES:

Uzbekistan was an early adopter of centralized state control over digital infrastructure, embedding surveillance into its approach to digital governance. Its model has since evolved in parallel with regional trends discussed in the Kazakh and Kyrgyz case studies.

Global Governance and Norms: Like its neighbors, Uzbekistan has worked alongside Russia and China to promote digital authoritarian governing norms. It notably co-sponsored the original submission of the International Code of Conduct for Information Security to the UN General Assembly in 2011—four years before the broader SCO proposal in 2015.[501]

State Dominance over Network Infrastructure: Russia and China have configured their network infrastructure quite differently, but both have centralized state control over those networks to monitor, disrupt, and intercept internet traffic.[502] The Uzbek government dominates its network infrastructure through Uztelecom. The state monopoly has the chokepoint control over the country's sole gateway for all international traffic, enabling government control and surveillance.[503] While Uzbekistan's network infrastructure is vastly less complex, it can

be compared to the PRC's network infrastructure, which includes bottlenecks for monitoring and controlling the flow of internet traffic.[504]

Internet Shutdowns: Uzbekistan has used this dominance over network infrastructure to throttle or even shut down access to the internet in the case of mass unrest. In June and July 2022, President Mirziyoyev proposed amendments to the Uzbek constitution, which would have ended the autonomous status of the Karakalpakstan region, triggering mass protests and violence.[505] The Uzbek government shut down both mobile- and fixed-line internet in the region during much of the crisis. China has used this tactic to control unrest in Xinjiang.[506] Russia has also restricted or even shutdown access to the internet in periods of protest.[507]

Trainings: Uzbekistan relies on Russian and PRC experts for technical training. Russian is the lingua franca in the ICT sector, and according to expert interviews carried out by USAID, Uzbekistan's Cybersecurity Center frequently relies on Russian specialists for training and support.[508] PRC companies are also involved in training Uzbek technology experts, for example through programs by Huawei and other PRC companies at venues like Uzbekistan's IT Park, and also at universities, where these actors have also built smart campus facilities.[509] Huawei facilitated the Mobile ICT Academy at the IT Park, and it organized a mobile exhibition around the country on digital skills.[510] Uzbek security officials also participate in exchanges with their Russian and PRC counterparts on digital policing practices. Uzbek officials attended the first meeting between Central Asia's Ministers of Internal Affairs and the PRC's Ministry of Public Security in September 2024, and they participate regularly in the CIS Council of Ministers of Internal Affairs, a Russia-led forum where interior ministries share tactics for protest management and suppressing unrest.[511]

LAWS AND REGULATIONS:

Expert interviews conducted for this report, along with a 2022 USAID study on Uzbekistan's ICT sector, highlight that limited capacity and resources within government bodies often result in Uzbek authorities directly copying Russian digital and civil society laws, often with little adaptation to local context.[512] The cumulative effect of these laws has been to expand the Uzbek government's ability to monitor its citizens, regulate their speech, and reduce the ability of domestic and foreign observers to assess the country's digital sector and practices.

Uzbekistan's **Law on Personal Data**, passed in 2019, is modeled after Europe's GDPR and enumerates several privacy rights. However, it also gives the government a significant amount of discretion to access personal data "in order to ensure state security," and does not apply to personal data obtained by law enforcement authorities. USAID found that these exceptions were similar to provisions found in comparable Russian legislation.[513]

The law was amended in 2021 to include **data localization** requirements, which stipulate that the personal data of Uzbek citizens must be stored and processed by "technical means physically located on the territory of Uzbekistan."[514] The provision is similar to those in Russia's data localization law, the User Data Storage Law (2014), and in China's Personal Information Protection Law (2021).[515] In July 2021, the government blocked Skype, Twitter, TikTok, VKontakte, and WeChat for being out of compliance with the personal data law.[516]

Uzbekistan has also adopted Russian laws that restrict media freedom and civil society organizations both on and offline. Uzbekistan's **Law on Mass Media** copies Russia's mass media registration law, which defines online publications as mass media, subject to the same registration rules as broadcast and print media. According to Article19, a UK-based human rights organization, the law subjects the media to onerous regulations, including an overbroad obligation to publish corrections or responses, and provisions that give state authorities power to command the publication of certain materials.[517] The law also gives the government broad powers to regulate speech through the arbitrary revocation of media licenses.[518]

Recent updates to Uzbekistan's NGO laws strongly resemble Russia's **Foreign Agents Law**.[519] The original 2012 Russian law required any organization receiving foreign funding to register as a "foreign agent" with the government but has since expanded to any individual or organization under vaguely defined "foreign influence".[520] In 2022 Uzbekistan implemented comparable foreign agent restrictions, requiring that any foreign-funded NGO appoint a government official to oversee project planning, and that any projects exceeding $55,000 in foreign funds be approved by the Uzbek Ministry of Justice and Cabinet of Ministers.[521] In July 2024, Radio Free Europe / Radio Liberty (RFE/RL) reported that Uzbekistan was considering a draft law based on Russia's **Undesirable Organizations Law**, originally passed in 2015 as a follow on to the Foreign Agent Law. This would allow Uzbek authorities to deport foreign "undesirable persons" or to bar them from entering the country for speech or actions that undermine state sovereignty or security.[522]

Analysis and Recommendations

Wired for Leverage: How Russia and China Shape Central Asia's Digital Future

Key Takeaway #1: Central Asian states have developed strategic dependencies on and vulnerabilities to Russia and China across all layers of the tech stack. These interconnected points of exposure put them at risk of more disruption and damage than any single dependency alone. While Russia is the most likely military aggressor in a regional military conflict, both could apply their respective strengths to coerce Central Asian states into compliance with their interests. In the case of a conflict in which their interests align, they could integrate intelligence from network intercepts, data center logs, and backdoors in devices and applications. This could allow them to build a sophisticated surveillance apparatus, enhancing their ability to monitor, influence, and disrupt Central Asian societies and governments.

Key Takeaway #2: At the Network Infrastructure Layer, Central Asia depends on international fiber-optic cable routes that run through Russia, and on PRC telecom equipment, exposing the region to surveillance, blackmail, and strategic dependence. Russia's control over these routes enables it to surveil, throttle, or disrupt regional connectivity. Moscow could exploit this dependence for blackmail—or even sever access to these routes entirely, crippling regional economies and communications. At the same time, PRC firms like Huawei are shaping the future of Central Asia's digital infrastructure by laying new fiber-optic cables and supplying most of the region's telecommunications equipment —a presence that can carry security risks even at the network edge. As Central Asia's digital economies become more reliant on PRC telecom equipment, switching to alternative providers may become prohibitively expensive, re-enforcing long-term dependencies. This growing presence allows the PRC not only to monitor regional internet traffic but also to establish potential collection points for future Europe-Asia data flows, enhancing its strategic leverage over global connectivity.

Key Takeaway #3: The Trans-Caspian fiber-optic cable (TC-FOC) project could liberate Central Asia from its reliance on Russia — or risk building greater internet and technology dependencies on China. According to the International Data Corporation (IDC), this fiber-optic cable project would have three important geopolitical implications for the region:

1. **An Alternative to Russia:** The Trans-Caspian cable will provide an alternative to fiber-optic routes through Russia, which are not only unreliable due to repeated network disruptions, but also pose significant data security risks.[523]

2. **A Digital Bridge to Europe:** By shortening the distance that internet traffic must travel between Europe and Asia, the TC-FOC will cut the costs and latency of internet service. This will open the door for closer collaboration with European and American cloud providers with data centers in Europe, while reducing Central Asia's reliance on Russian and PRC service providers. It would also support local digital economies in domains like e-commerce, fintech, and cloud services.

3. **A Reshuffling of Eurasian Internet Traffic:** The IDC forecasts that the TC-FOC will pull some internet traffic away from the submarine fiber-optic cables "used by Chinese operators to connect with European networks" and reduce the latency of related services. It will also attract traffic away from the existing routes through Russia to Europe. The IDC estimates that by 2030, 70% of the Europe-Asia internet traffic passing through Kazakhstan will pass through the TC-FOCL, with the remainder passing through the traditional crossings at the Russian border.[524]

In June 2024, Kazakhstan's Minister of Digital Development Minister Zhaslan Madiev announced a tender for design and construction of an underwater fiber-optic cable is being finalized."[525] The contractor has not been chosen, but both Kazakhtelecom and AzerTelecom have worked with PRC vendors in the past. AzerTelecom lists both China Telecom and Huawei as key partners in its "Azerbaijan Digital Hub program."[526] Selecting a PRC vendor for the TC-FOC project would deepen the region's reliance on PRC network equipment and heighten its exposure to espionage risks linked to potential backdoors in PRC equipment. It also heightens the risk that the PRC could use its equipment to conduct cyberattacks or disrupt internet traffic during geopolitical crises of conflict. Recent incidents in the Baltic Sea involving Russian and PRC ships sabotaging subsea infrastructure underscore the physical security risks to submarine fiber routes.[527]

The European Union is positioning itself as the leading external actor responding to this window of opportunity. An expert interviewed for this report familiar with talks said that the EU has engaged with Central Asian officials to discuss investment in the Middle Corridor under the Global Gateway initiative.[528] The expert said investments in physical infrastructure could set the stage for the installation of fiber-optic infrastructure. While no official fiber-optic projects have been announced, European Commission President Ursula von der Leyen unveiled a €12 billion investment package for Central Asia at the April 2025 EU–Central Asia summit in Samarkand, including €100 million for satellite internet via Team Europe.[529] Though useful as contingency infrastructure, satellite connectivity offers limited bandwidth at high cost and is no substitute for fiber. If Europe hopes to support network-level autonomy in the region, it may need to scale its investments to better compete with China's far more substantial digital footprint.

Member states have also put forward their own initiatives. When German Chancellor Olaf Scholz met with the five Central Asian leaders in September 2024, they discussed closer cooperation in transportation, energy and logistics along the Middle Corridor including a transmission cable that would run beneath the Caspian sea and carry green energy to Europe.[530] By contrast, the United States has remained on the sidelines, and has not played a major role in either the Middle Corridor or the TC-FOC project.[531]

Key Takeaway #4: Central Asian governments and businesses depend on data centers and cloud services provided by Russian and PRC firms, exposing sensitive data to security risks and creating long-term strategic dependencies. Across the region, Russian and PRC cloud vendors support the financial, manufacturing, transportation and government services sectors, among others. Data stored by these firms could be vulnerable to exfiltration and manipulation, and both Russia and China could use their control over key cloud services to disrupt or sabotage key economic sectors and public services.

If Central Asia's digital economies continue to grow more reliant on Russian and PRC cloud providers, switching to alternative providers may become prohibitively difficult. In cloud services, vendor lock-in occurs when customers face technical or financial barriers to migrating their data and applications, often due to limited interoperability between cloud platforms.[532] Continued PRC and Russian investment in cloud services could entrench this dependence, giving both countries long term commercial advantages and strategic leverage in the region.

Key Takeaway #5: The PRC's influence enables digital authoritarian governance practices through PRC-brand personal devices and IoT surveillance devices. PRC firms have also partnered with local organizations to manufacture semiconductors and computer hardware, including for government projects. All three countries have partnered with PRC companies like Huawei, ZTE, Dahua, and Hikvision to deploy "safe city" facial-recognition surveillance systems, which have already been used by domestic and Russian security forces to identify dissidents.

Key Takeaway #6: Popular platforms Telegram, VK and TikTok pose systemic data privacy risks, support state censorship, and facilitate Moscow and Beijing's information manipulation campaigns. These risks apply globally, but are especially pronounced in Kazakhstan, Kyrgyzstan, and Uzbekistan, where all three platforms have millions of users and where few institutions in government or civil society possess the capacity—or in some cases, the incentive—to detect, attribute, or respond to manipulation campaigns, particularly when such platforms also serve domestic surveillance interests. In Ukraine, authorities moved to restrict Telegram due to concerns about its exploitation by Russian intelligence during wartime — concerns that are increasingly echoed in Central Asia, where similar vulnerabilities could be exploited in times of geopolitical tension.

Key Takeaway #7: PRC "smart applications" across multiple strategic sectors, have created risks of long-term dependence on the PRC for critical economic and government functions. PRC firms have provided these solutions in sectors including, but not limited to, the transportation, logistics, e-commerce, agriculture, manufacturing, and e-government sectors.

Balancing Between Giants: Central Asia's Quest for Autonomy

Key Takeaway #8: Despite these vulnerabilities, Central Asian governments still have discretion to manage their dependencies. They are sovereign balancers, looking to avoid dependence on any one actor while maximizing their own interests. Central Asian governments are asserting greater autonomy from Russia. Central Asian officials have openly supported Ukraine's sovereignty after Russia's invasion,[533] while efforts to develop non-Russian fiber optic routes demonstrate a clear intent to reduce reliance on Moscow. At the same time, experts note that regional leaders are aware of the risks of economic engagement with China, and are acting not out of naïveté, but out of a desire to pursue national development goals in the absence of viable alternatives.[534]

Key Takeaway #9: Russia and China's strengths in Central Asia's technology stack are complementary to one another. Competition between Russian and PRC firms is unlikely to jeopardize the Sino-Russian relationship.

Whereas Russian and PRC firms compete directly across the stack—Russian companies have lost out to PRC companies in the surveillance camera market, for example[535]—competition is not the most salient aspect of

the Russia-China relationship in Central Asia. A March 2023 joint statement between Russia and China, for example, includes a commitment to "coordination in supporting the Central Asian countries in ensuring their sovereignty and national development," and a refusal to "accept attempts to import 'color revolutions' and external interference in the affairs of the region."[536] Although there is little public evidence of direct, formal cooperation between Moscow and Beijing in the region's tech stack, their actions on the ground—alongside those of aligned private firms—reveal a shared preference for fostering a stable, anti-Western, and authoritarian digital sphere of influence.

Rather than competing, Russian and PRC influences dovetail together. Central Asian governments are increasingly adopting digital authoritarian practices that blend PRC technology with Russian-inspired legal frameworks—often defaulting to the latter due to linguistic, cultural and people-to-people ties, according to regional experts. PRC firms dominate hardware across the stack, from network equipment and data centers to personal devices and industrial technology, while Russian firms lead in software services, including cloud computing, enterprise solutions, and digital platforms like social media. Even in areas where Russian and PRC firms compete — like cloud services and digital surveillance technologies — PRC hardware supports Russian software.

Losing Ground: Western Tech Struggles to Compete in Central Asia

Key Takeaway #10: Despite their technological strengths, the United States and Europe face challenges in offering a viable alternative to Russia and China in Central Asia due to the region's small market, compliance burdens related to operating there, difficulties matching their competitors' pricing, and linguistic barriers.

High Market Risks: Multiple interviews with ICT sector professionals and experts indicated that US and EU technology companies see limited profit potential in Central Asia due to its small market size, compliance burdens, and business risks. Experts interviewed for this report noted that the need to comply with US and EU anti-corruption laws and data protection laws and practices contributes to Western tech firms' reluctance to operate in a region where corruption is widespread. Kazakhstan and Uzbekistan's data localization laws were also frequently cited as a barrier for western cloud providers. A regional ICT expert said that improved fiber-optic links to Europe could mitigate these challenges by enabling cloud providers to serve the region remotely.

High Compliance Burdens for Development Initiatives: Western engagement in Central Asia is shaped by high standards on governance, human rights, and environmental protections, which regional experts interviewed for this report viewed as both an asset and a liability. While these standards reflect important values and provide long-term benefits, they can also make Western businesses and development aid programs less nimble compared to partners like Russia and China, which are less constrained by such concerns. One American entrepreneur active in the region noted that while a great number of projects under China's BRI have been completed during his many years in the region, many equivalent EBRD projects are still in the planning stages due to environmental, anti-corruption, and sanctions compliance reviews.

Price Competitiveness: Cost is a decisive factor in Central Asia's tech procurement, where Western products, despite their reputation for quality, are often too expensive. Experts interviewed for this report noted that PRC technology has improved, with many devices now matching or surpassing Western alternatives at significantly

lower prices. With China offering deeply subsidized, cost-competitive hardware, experts stressed that identifying ways to make Western technology more affordable is essential for maintaining relevance in the region.[537]

Language Barriers: Linguistic and cultural ties reinforce Russian influence in Central Asia's technology stack. English proficiency is limited outside elite circles, and Russian remains the region's lingua franca. In an interview for this report, Oyuna Baldakova highlighted that when Cisco stopped translating their documents into Russian because of Russia's invasion of Ukraine, "this became a barrier to entry" for Central Asian ICT professionals interested in adopting their tools and standards. In contrast, Russian firms offer localized products in Kyrgyz and Uzbek, which comparable services in the West, such as Apple's Siri assistant, do not offer. Civil society experts noted that Western programs meant to counter Russian information manipulation in the region often neglect online public discourse happening in Kazakh, Kyrgyz and Uzbek. They pointed out that Russia's extensive information campaigns shape public sentiment to such an extent that they hinder greater Western involvement. At the same time, major PRC technology companies like Huawei and Alibaba have experience doing business in Russia and provide Russian-language versions of their products and services.[538]

Recommendations to Policymakers:

As competition over digital infrastructure intensifies, both the United States and Europe will need to develop their own strategic approaches to Central Asia, where PRC and Russian firms already wield significant influence over networks, cloud services, and smart applications, and Russian legal frameworks predominate. Absent increased, targeted, and sustained investment in Central Asia's digital technology stack, both the United States and Europe risk being sidelined in this strategically pivotal region. Authoritarian digital consolidation is accelerating, bolstered by restrictive policies such as Russia-style foreign agent laws that undermine transparency and fair competition.

As US policymakers reassess America's global role under the second Trump administration, they should consider how disengagement with the region could further open the door to PRC influence. Meanwhile, EU policymakers should prepare for a less globally active and strategically consistent America. Europe should take greater responsibility for shaping its own independent digital presence in the region. To build regional resilience and offer credible alternatives to authoritarian models, both the United States and Europe should pursue targeted ICT investments, deepen ties with local stakeholders, and advance their own competitive digital offers.

#1 - Equip US and EU infrastructure finance organizations to compete with PRC alternatives.

- **Expand financing for ICT projects in Central Asia:** US and European lawmakers should prioritize ICT investment in this geostrategic region. Since 2011, the Development Finance Corporation (DFC) has funded nine projects in Kazakhstan, Kyrgyzstan, and Uzbekistan, totaling just over $17 million, with no major investments in regional network infrastructure.[539] The European Bank for Reconstruction and Development (EBRD) has cumulatively invested €17.5 billion in the three case study countries since 1996, yet none has gone toward telecommunications, media, or technology (TMT).[540] Despite President Ursula von der Leyen's April 2025 announcement that the EU would provide €100 million for satellite internet in Central Asia,[541] these investments are modest relative to the billions of dollars that China has invested in the region's technology stack. As Congress reauthorizes the DFC in 2025, it should raise the agency's

investment ceiling and include new investments in Central Asia's technology infrastructure.[542] While the EBRD's 2025-2029 TMT strategy contains the aim to collaborate with the ADB on digital infrastructure in the region, the EBRD should expand its own independent efforts.[543]

- **Expedite pre-implementation review processes:** PRC development projects move faster than Western alternatives at every stage, from identification to completion.[544] Central Asian experts highlighted slow pre-implementation reviews at the EBRD. Europe and the United States should find ways to match the PRC's speed. At the DFC, stringent environmental, anti-corruption, and sanctions compliance requirements can delay approvals for up to two years or prevent investment altogether, with disbursements often taking even longer.[545] US and EU legislators should each work with DFC and EBRD officials respectively to ensure they have the resources they need to complete project reviews in a timely manner, and identify opportunities to streamline existing review processes, clarify investment criteria, and accelerate project review timelines.

- **Do not fund adversary tech:** US and EU institutions should ensure they do not bolster PRC ICT influence. The EBRD, for instance, has directly funded PRC smart infrastructure projects in Uzbekistan (see page 59).[546] US and EU legislators should block development finance bodies from investing in projects that use technology from countries of concern, even if the vendor is not on an export control or sanction list. The United States and EU should set up an interagency process in which intelligence agencies and entities like the US Bureau of Industry and Security support this screening process.

- **Create dedicated programs for digital infrastructure:** Unlike the EBRD, which has a specialized digital infrastructure program (TMT) that has invested over €6.6 billion across Europe, the DFC lacks a focused initiative for ICT networks and cloud computing.[547] Its broader "Infrastructure and Critical Minerals" program covers everything from seaports to mineral supply chains, resulting in limited and scattered digital investments.[548] The US Congress should create a dedicated digital infrastructure program at the DFC, staffed with network and cloud technology experts to enhance competitiveness.

- **Expand the mandate and resources of the EU's IFCA to include technology:** The unique security and developmental challenges in countries along the Middle Corridor in Central Asia and the Caucuses may demand region-specific measures and expertise. The EU could empower the Investment Facility for Central Asia (IFCA) with more funding, expertise and authority to coordinate investments to be more responsive to the needs of the region's ICT sector.[549]

#2 - Promote Open RAN standards as a tactic to dislodge PRC network equipment in Central Asia:

- **Continue US support for Open RAN development and deployment:** In the face of programmatic cuts, the US should continue supporting Open RAN development through the State Department's International Technology Security and Innovation Fund and the Department of Commerce's Public Wireless Innovation Fund,[550] while ensuring that pilot projects extend to Central Asia by making it a point of discussion at future C5+1 meetings. President Trump's Department of Government Efficiency (DOGE) has dismantled the U.S. Agency for International Development (USAID), with the stated intention of transferring some of its programs to the State Department.[551] Washington should consider re-instating former USAID programs with direct relevance to the ICT sector at the State Department, including support for initiatives like the Asia Open RAN Academy, to train ICT professionals in Open RAN deployment across Central Asia and the Indo-Pacific.

- **Adopt a Measured Open RAN Approach for Europe to compete with PRC network equipment abroad:** While European telecom firms like Ericsson and Nokia are leaders in Open RAN,[552] there is an ongoing debate among EU policy analysts about whether Open RAN is a viable option to improve European competitiveness. On the one hand, the Draghi report urges the EU to strengthen its telecom sector by investing in Open RAN and supporting European equipment providers.[553] On the other, some European policy analysts have argued that Open RAN could undermine the competitive position of proprietary European telecom systems and fail to prevent network operators from incorporating PRC equipment.[554] Yet in regions where cost pressures and PRC dominance make closed, European-led deployments less viable, Open RAN offers a strategic foothold. Rather than promoting Open RAN universally, the EU could support it selectively—especially in strategic geographies like Central Asia—where it can serve as a pragmatic pathway to displace PRC vendors over time, diversify supply chains, and maintain European presence in access networks. Through Global Gateway, the EU could explore targeted public-private partnerships with firms like Ericsson and Nokia to pilot secure, EU-aligned Open RAN deployments. The EBRD's 2025–2029 TMT strategy could also be updated to include technical assistance for these efforts, ensuring alignment with European standards and long-term strategic autonomy goals.[555]

#3 - Position US and EU firms as suppliers for the Middle Corridor:

- **Use trade promotion to support Western alternatives:** While the European Commission and US Commerce Department engage in Trans-Caspian Transport Corridor (TCTR) coordination,[556] Washington and European capitals should also leverage commercial promotion organizations like the Commerce Department's International Trade Administration (ITA) to support Western alternatives to Huawei. The US should expand staffing for the US Commercial Service under the ITA, prioritizing regional experts, linguists, and local ICT professionals to help American firms navigate regulatory barriers and compete with subsidized PRC alternatives. European trade promotion agencies should take similar steps. Both should launch trade missions focused on digital trade and cloud services.

- **Prioritize bids for the Trans-Caspian fiber-optic cable and related projects:** Improved fiber connectivity between Central Asia and Europe will improve European and American cloud providers' competitiveness in the region. Ensuring trusted vendors build this infrastructure can help reduce the region's dependence on Russian and PRC technology, strengthening regional security and resilience.

- **Establish an EU Digital Gateway Coordination Taskforce:** The EU lacks a counterpart to the ITA, relying instead on consensus-driven "Team Europe" initiatives. While effective in climate and clean energy, this model has led to fragmented and slow execution in digital connectivity projects, where institutional capacity is weaker at both the EU and member state levels.[557] To address this gap, the European Commission should create a dedicated coordination mechanism at the Secretariat-General that works with the bodies relevant to the digital components of the Global Gateway, including the Directorate General for International Partnerships, DG Connect, and others. This mechanism would provide strategic oversight, streamline efforts, and accelerate deployment of Europe's tech solutions in strategic markets. The mechanism would also serve as a platform to convene and coordinate Europe's existing roster of trade promotion bodies, like Eurochambres—an association of European chambers of commerce—to drive innovation in how the EU and its member states deliver competitive digital solutions in strategic third markets.

#4 - Expand US and European competitiveness in smart applications: To enhance regional resilience, policymakers should promote secure, high-quality alternatives to PRC digital solutions in strategic sectors and strengthen Central Asia's own innovation ecosystem.

- **Expand market access for smart solutions providers:** US and EU trade promotion through the ITA and equivalent bodies should extend from traditional infrastructure to application-layer technologies, including digital public services, logistics, manufacturing, and digital finance. Smart solutions often require customization and integration with local government and business operations. Entering this market requires a more tailored commercial diplomacy, including outreach to ICT procurement officers in local governments across the region.
- **Support Central Asia's innovation ecosystem:** Kazakhstan's Astana Hub, Kyrgyzstan's High Technology Park, and Uzbekistan's IT Park are all government-sponsored incubator and accelerator programs. They partner with investors and technology companies from around the world, including those from the United States and Europe. The United States and the EU should provide targeted funding, technical assistance, and mentorship through their respective development assistance programs.
- **Create dedicated US / EU-backed venture funds:** The United States and EU should consider setting up financing instruments with a higher risk tolerance for investing in promising local startups and key technological developments in strategic regional economies like Kazakhstan and Uzbekistan.[558]

#5 Create public-private platforms for cross-sector collaboration. To foster innovation, competition, and stronger governance, governments should facilitate structured engagement among Central Asian firms, international technology providers, private and public finance bodies, and regional policymakers. Expanding platforms like the B5+1 forum, organized by the Center for International Private Enterprise (CIPE) and supported by the US State Department, would provide a venue for discussing vendor diversification, regulatory challenges, and investment opportunities. Similar EU initiatives should integrate discussions on digital trade, cybersecurity, and ICT governance.

- **Sponsor regional ICT industry fora:** Trade delegations, regional investment forums, and public-private dialogues should prioritize market-driven solutions that enhance both economic development and digital resilience. In June 2024, USAID co-hosted the Central Eurasian Venture Forum in Almaty with local tech venture firms.[559] The State Department should consider continuing similar programs to connect Central Asian entrepreneurs with American technologists and capital, and the EU should build on its Trusted Investors Network to sponsor comparable regional fora.[560]

#6 Promote stronger transparency, cybersecurity, and governance standards:

- **Encourage measures to enhance resilience:** Make use of coordination bodies like the EU's Central Asia Rule of Law Program and the US Digital Trade Working Group under the US-Central Asia Trade and Investment Framework Agreement (TIFA) and the C5+1 to encourage practical measures that reduce vulnerabilities to Russian and PRC coercion. Such measures would include improving regulatory frameworks, promoting cybersecurity best practices, and building capacity for digital governance.

- **Establish cybersecurity capacity-building partnerships:** Promote collaborations with Central Asian governments and universities to raise cybersecurity awareness, strengthen regulatory frameworks, and train the next generation of regional cybersecurity experts. These efforts can be spearheaded by the European Union Agency for Cybersecurity (ENISA), the United States' Cybersecurity and Infrastructure Security Agency (CISA), and the National Initiative for Cybersecurity Education (NICE) at the National Institute of Standards and Technology (NIST).[561]

- **Organize technical exchanges on digital regulations:** Technical exchanges between Central Asian legislators and their European and American counterparts would offer policymakers a broader set of frameworks to consider when drafting legislation. This could help reduce reliance on Russian legal templates that often prioritize state control.

- **Organize Track II dialogues on digital governance issues:** The United States and the EU should create more channels for Central Asian think tank experts to engage with their counterparts in Europe and the United States. Many of these think tanks advise Central Asian leaders, and private discussions may help identify methods to combat Russian and PRC influence in the governance layer. Public-private platforms like the B5+1 (see #5 above) could serve a similar role, providing major US and EU cloud providers with a forum to highlight how policies like data localization pose significant barriers to their participation in Central Asian markets.

#7 Support Central Asian civil society organizations: Local civil society groups play an indispensable role in monitoring and exposing opaque developments in the region's digital infrastructure—often serving as the only independent sources of insight into the technology stack on the ground. As US foreign assistance diminishes under the second Trump administration, the European Union may need to step in decisively to preserve the capacity of local organizations.

- **Engage in discreet, coordinated diplomacy:** While Central Asian governments expect the EU to uphold its values in negotiations, public criticism is unlikely to be effective unless it is part of a broad, coordinated effort.[562] Experts interviewed for this report noted that Central Asian governments were highly sensitive to reputational risks that could deter investment and ICT diversification efforts. Private engagement should be the primary tool for influencing policy decisions, but when public criticism is necessary, it should be strategically coordinated with partners to maximize impact and avoid the pitfalls of unilateral approaches.

- **Coordinate with like-minded states with interests in the region to combat Russia-style foreign agent laws:** When and where possible, EU should use coalition-driven responses to discourage adoption and implementation of these laws, working with like-minded states that have strategic, economic, or historical interests in regions like Central Asia affected by these laws, such as Japan and South Korea. By leveraging these relationships, policymakers can frame civil society protections as a matter of regional stability, economic development, and governance resilience, rather than as a narrow Western ideological priority.

#8 The US and EU should each expand technology analytical capacity and adopt the technology stack framework as a SWOT analysis tool for techno-economic statecraft.[563]

- **Create a Technology Competitiveness Analysis Center (TCAC):** In the United States, as Lindsay Gorman, Managing Director of GMF Technology, has recommended to the US Congress, such a center could be modelled after the National Counterterrorism Center or National Counterintelligence Center. It would perform red-blue team analyses in key technology industries and adopt a technology stack framework for understanding PRC penetration of network infrastructure (5G/6G, satellites, undersea cables), data and cloud services, devices, applications, and governance at home and abroad. It could be housed at the US Commerce Department, and draw on expertise from an expanded commercial service, the Department of Defense, the national labs, and the intelligence community.[564]

- **Create a European Technology Competitiveness Analysis Mechanism:** To compete more effectively with the PRC in strategic technologies around the world, the EU needs stronger institutional capacity for technology competitiveness analysis. Ideally, this effort would be housed in a new dedicated directorate like the TCAC, but even without formal reorganization, it could draw on existing Commission bodies—such as DG Trade for economic security and DG Connect for digital expertise—and be coordinated through the Secretariat-General. This mechanism should provide economic security assessments focused on digital and cybersecurity risks; competitive intelligence to assess and promote European digital offerings both within the EU and in key third-country markets; policy recommendations to address gaps in the EU's offerings; and opportunities for the EU and its member states to strategically deploy digital infrastructure and development financing in a geopolitically shrewd manner. The aim would be to produce forward-looking analyses of digital infrastructure opportunities, assess the PRC technology penetration across the stack, and support the Global Gateway by identifying where and how European solutions can serve as credible alternatives to PRC offerings.

- **Revive Digital Ecosystem Country Assessments (DECA) and apply the tech stack framework:** Prior to its termination by the second Trump Administration, USAID conducted country-level analyses of individual countries' ICT sectors, compiling and organizing both publicly available information, and interview data from regional ICT and government experts.[565] These DECA reports have been invaluable resources for both independent researchers and government officials. Future DECA reports could be done at the Technology Competitiveness Analysis Center (TCAC) and draw on the tech stack framework to identify both opportunities for the US and its allies to strategically invest in third markets, as well as strategic risks for countries hosting technology from the PRC or other countries of concern. The EU could apply the tech stack framework in a similar manner at the ETCD.

Conclusion: What is at Stake in Central Asia

As Kazakhstan, Kyrgyzstan and Uzbekistan pursue their legitimate digitalization goals, their lack of alternative vendors leaves them vulnerable. Their growing reliance on PRC telecommunications equipment and Russian fiber-optic networks exposes them to espionage, surveillance, and coercion. The proliferation of PRC cloud services, data centers, and "smart" applications not only makes user data vulnerable to exfiltration but renders entire strategic industries like manufacturing and agriculture reliant on services provided by Beijing.

Central Asian governments' adoption of PRC and Russian technologies has significantly contributed to the region's shift toward entrenched digital authoritarianism. All three case study countries use Russian tools to monitor internet traffic, PRC-built "safe city" surveillance systems, and Russian platforms that amplify disinformation and erode support for democratic norms. As Central Asian leaders navigate how to manage increasingly educated, connected, and affluent societies, they have applied aspects of both Russia and China's governance models—sometimes replicating Russian laws verbatim, and at other times adopting Beijing's tactics, like mass internet shutdowns, to suppress domestic dissent.

The core battleground of 21st-century geopolitics is not just territory or ideology, but technology—and the infrastructure needed to deploy and control it. Nowhere is this more evident than in Central Asia, where Russia and China are laying the foundation for a shared vision of internet governance and digital infrastructure designed to serve state power. The outcome will shape the global balance of power for decades to come.

If the United States and Europe fail to act, the heart of Eurasia risks being folded into a contiguous zone of consolidated digital autocracies. As Moscow and Beijing gain control over the region's tech stack, Central Asian states may find themselves coerced into strategic alignment, functioning as client states. As physical and digital connectivity infrastructure is built across the Middle Corridor, this joint domination would grant Russia and China greater resilience against western sanctions, and greater influence over global internet traffic, novel trade routes, and critical mineral supplies.

From this position, they could project power more directly into neighboring regions—from Eastern Europe and the Middle East to South Asia—shifting regional dynamics in their favor. Though not a formal bloc, the gravitational pull of a China-led Eurasian order could draw in neighboring states, many of which—facing limited alternatives—may seek accommodation over resistance. Without a credible counterweight, the foundations of sovereignty, openness, and strategic pluralism across Europe and Asia could erode. Left unchecked, these dynamics risk inaugurating a Eurasian Century—with Chinese power at its beating silicon heart, and the United States and Europe relegated to the periphery of the world's decisive geopolitical theater. To forestall such a future, the Transatlantic policymakers should act swiftly to preserve sovereign choice over Central Asia's digital future.

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