

U.S.-China Economic and Security Review Commission

Issue Brief



September 20, 2022

LOGINK: Risks from China's Promotion of a Global Logistics Management Platform

Author: USCC Staff

Acknowledgments: The authors thank Pointe Bello for providing extensive research on LOGINK's background and international partnerships. Their assistance does not imply any endorsement of this report's contents, and any errors should be attributed solely to the authors.

Disclaimer: This paper is the product of professional research performed by staff of the U.S.-China Economic and Security Review Commission and was prepared at the request of the Commission to support its deliberations. Posting of the report to the Commission's website is intended to promote greater public understanding of the issues addressed by the Commission in its ongoing assessment of U.S.-China economic relations and their implications for U.S. security, as mandated by Public Law 106-398 and Public Law 113-291. However, the public release of this document does not necessarily imply an endorsement by the Commission, any individual Commissioner, or the Commission's other professional staff, of the views or conclusions expressed in this staff research report.

Table of Contents

Executive Summary.....	3
Introduction: From Physical to Digital Connectivity	4
LOGINK’s Background and Evolution.....	4
LOGINK’s Development from a Domestic to International Platform	5
LOGINK Advances Key CCP Objectives.....	6
China’s International Promotion of LOGINK.....	8
Potential Impact on U.S. Commercial and Security Interests	10
Considerations for Congress.....	11

Executive Summary

As part of a broader effort to become a transportation superpower,* China aims to create an efficient, integrated platform for the transmission of logistics data called the National Transportation and Logistics Public Information Platform, branded as LOGINK. Beginning as a Chinese provincial initiative in 2007, LOGINK became part of a regional network in Northeast Asia in 2010 and a global platform after 2014. The state-sponsored and -supported platform has now expanded to partner with over 20 ports worldwide as well as numerous Chinese and international companies.

LOGINK provides users with a one stop shop for logistics data management, shipment tracking, and information exchange needs between enterprises as well as from business to government. China's government is encouraging global ports, freight carriers and forwarders, and other countries and entities to adopt LOGINK by providing it free of charge. In addition to offering LOGINK itself as a platform for data management, China is promoting logistics data standards that would support the platform's widespread use. A second generation of LOGINK, now under development, would offer a cloud-based suite of enterprise software applications, such as advanced data analytics and business partner relationship management tools. These upgrades would afford LOGINK even greater access to global commercial data, potentially giving China's government an unparalleled window into commercial transactions and trading relationships.

Widespread adoption of LOGINK could create economic and strategic risks for the United States and other countries. As with other Chinese entities sponsored or subsidized by the government, LOGINK could undercut U.S. firms that provide more innovative products at higher costs without state support. LOGINK's visibility into global shipping and supply chains could also enable the Chinese government to identify U.S. supply chain vulnerabilities and to track shipments of U.S. military cargo on commercial freight. Though LOGINK claims users can share only the data they want, the security of the platform is unclear. The Chinese Communist Party (CCP) could potentially gain access to and control massive amounts of sensitive business and foreign government data through LOGINK.

Background: Advances and Changing Market Dynamics in Logistics Technology

The transportation and distribution of goods involves a complex sequence of logistical tasks to ship items between manufacturers and warehouses, through ports and customs, to wholesalers, retailers, and ultimately to consumers. All of these steps involve transmission of data: key documents and information, such as bills of lading and customs approvals, follow goods along the supply chain. Until recently, the systems for transmitting this information relied on hardcopy paper and file storage, with processes and data fragmented by region and function.

Technical advances beginning in the mid-2000s made it possible to streamline dataflows and improve communication between partners within logistics networks.¹ The internet of things (IOT) enabled tracking of goods in international freight and customs using cloud computing, satellite navigation systems like the Global Positioning System (GPS), and connected technologies such as smart sensors and radio-frequency identification (RFID).^{† 2} Logistics paperwork also became far more efficient as businesses and customs agencies transitioned to online portals and other digital processes. Globally, standards-setting organizations facilitated the interoperability of these advances between countries.

Logistics business models continue to change today due to greater availability of data, the shift from brick-and-mortar retail to e-commerce, and supply chain disruptions from the novel coronavirus (COVID-19) pandemic.

* In 2019, China's government released a key document that essentially lays out a thirty-year plan to become an international leader in transportation, including innovation in transportation equipment and infrastructure as well as operation of transportation and logistics services. Chinese Communist Party Central Committee and State Council, *Logistics Superpower Construction Outline* (《交通强国建设纲要》), September 19, 2019. Translation. http://webcache.googleusercontent.com/search?q=cache:WUS1w0i1QNEJ:www.gov.cn/zhengce/2019-09/19/content_5431432.htm+&cd=1&hl=en&ct=clnk&gl=us.

† RFID technology identifies people and objects using radio waves and wireless devices called "tags." RFID readers transmit radio signals that activate tags, which in turn send data, such as location and package contents, back to the reader. The technology became commercially available in the 1970s but only become widespread in the 2000s with decreased equipment cost, improvements in performance, and unification of global standards. Chong Ryol Park and Ki Hwan Eom, "FID Label Tag Design for Metallic Surface Environments," *Sensors* 11:1 (January 17, 2011). <https://doi.org/10.3390%2Fs110100938>; Mario Cardullo, "Genesis of the Versatile RFID Tag," *RFID Journal* (April 21, 2003). <https://www.rfidjournal.com/genesis-of-the-versatile-rfid-tag>.

Startups are competing with conventional freight forwarding services—companies like DHL that arrange cargo for shippers—on a number of fronts, including more agile price quotes, efficient robot-run warehouses, and blockchain document validation.³ Supply chain disruptions have also increased demand for supply chain visibility and intelligence services that allow customers to track production and anticipate delays. With venture-backed logistics technology platforms disrupting traditional freight forwarders, the market for these services may also be more susceptible to distortion at a time when China’s government is intervening to support Chinese platforms and interests.

Introduction: From Physical to Digital Connectivity

China aims to become a transportation superpower, supporting its expanding global reach through the Belt and Road Initiative (BRI) and related efforts. These ambitions involve exercising substantial control or influence over the physical movement of goods around the world, including through ownership of key nodes in international transportation like ports and by accruing dominant market position in shipbuilding and shipping—goals Chinese firms have already reached or are rapidly making inroads toward achieving.* As part of its Digital Silk Road strategy, China also aims to control data and information flows that accompany the movement of goods. This includes the information and communications infrastructure that supports the global logistics industry as well as the software platforms and databases that track goods in transit and enable communication between different participants in a supply chain.

To increase China’s influence in international logistics, China’s Ministry of Transportation (MOT) is promoting a unified logistics platform formally called the National Transportation and Logistics Public Information Platform and abbreviated as LOGINK (for “logistics link”). Unlike shipbuilding, shipping, and port equipment—in which Chinese companies are competing for a share in well-established markets—logistics management platforms are a new and evolving service. China’s state-funded effort to obtain first mover advantage could enable LOGINK to shape how the market evolves, setting the rules of the road in a way that favors Chinese firms and otherwise advances China’s interests. It could also give China’s government access to sensitive data, including commercial transport of U.S. military cargo, insight into supply chain vulnerabilities, and critical market information. All this could help Chinese firms compete on unequal footing in the nearly \$1 trillion third-party logistics industry, in particularly the freight forwarding services market estimated at just under \$200 billion.⁴

LOGINK’s Background and Evolution

LOGINK is a logistics management platform that allows users to communicate and exchange documents and data with each other as well as look up information such as cargo location or price quotes from freight carriers.⁵ It also facilitates customs clearance through the provision of cargo data, tariff code designations, and other relevant information. Operated by the Zhejiang Province Transportation Department, LOGINK is meant to be a “one stop shop” for the exchange of all logistics information (see Table 1).⁶ It is subsidized by MOT and offered free of charge for participants in a supply chain, such as shippers and receivers, freight carriers, and port operators, but they must adopt LOGINK’s standards to exchange data with the platform.⁷ LOGINK also allows access to shared data on the platform by third parties, like information services that offer supply chain data analytics.⁸

LOGINK incorporates elements of “single window” or “single national window,” a term used in international trade and customs to refer to a unified portal for electronic filing and exchange of information between businesses and a

* As analysts at the Center for Strategic and International Studies note, in 2019 Chinese companies controlled the second-largest global shipping fleet; produced over a third of ships and more than 80 percent of ship-to-shore cranes; and owned seven of the ten busiest ports in the world (including Hong Kong). Jude Blanchette et al., “Hidden Harbors: China’s State-Backed Shipping Industry,” *Center for Strategic and International Studies*, July 8, 2020. <https://www.csis.org/analysis/hidden-harbors-chinas-state-backed-shipping-industry>.

government.*⁹ However, its scope of information exchange and its geographic ambitions extend far beyond comparable single window systems.

Table 1: Information Flows Enabled by LOGINK as of 2018*

Direction of Information Flow	Types of Information Exchanged
Government to business (G2B)	<ul style="list-style-type: none"> • <i>Vessel and cargo status</i>: Tracking and schedule data for ocean carriers, railway, air freight, and trucks; entry and exit status for cargo in ports, warehouses, and other hubs; customs, quarantine, and inspection status of cargo; etc. • <i>Corporate registries and due diligence</i>: Business registration, credit, regulatory compliance, and violation information; drivers' licenses and permit information for truck fleets; etc. (15 databases total) • <i>Transit conditions</i>: Road, waterway, and rail conditions; information on delays at ports and in drayage; etc. • <i>General information</i>: Policies, regulations, standards, and statistics from governments and industry associations.
Business to government (B2G)	<ul style="list-style-type: none"> • Customs clearance • Other regulatory information, such as declarations on hazardous materials • Electronic way billing for port authorities and railway • Geolocation data (e.g., on trucks[†]) from satellite navigation systems and sensors
Business to business (B2B)	<ul style="list-style-type: none"> • Electronic booking (e.g., for freight forwarding services) • Price inquiries and freight price indices[‡] • Financing and insurance • Billing and payment • Search for services on the platform • Document exchange

* G2B sources taken from LOGINK's 2018 data catalogue, the most current publicly available.

Source: Various.¹⁰

LOGINK's Development from a Domestic to International Platform

LOGINK began as an initiative to reduce logistics costs in the wealthy coastal province and commercial hub Zhejiang, home to e-commerce giant Alibaba.¹¹ Since its launch in 2007, LOGINK has evolved through three phases: an initial phase focused on standardizing domestic logistics across provinces from 2007 to 2012; an intermediate phase focused on regional integration with ports primarily in Northeast Asia from 2010 to 2016; and a period of international expansion beginning in 2014. Beyond international expansion, LOGINK's intended future involves offering a wider variety of utilities through the platform, potentially disrupting or capturing a greater share of the nearly \$200 billion freight forwarding market and related services and gaining access to a wider variety of data.¹²

* China has a separate single window for customs called China E-Port that began development in the late 1990s and was unveiled in 2000. E-Port windows for major Chinese ports, such as Ningbo, link directly to LOGINK. United Nations Economic and Social Commission for Asia and the Pacific Committee, "Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness," July 4, 2016, 14–20, 247. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.

[†] According to LOGINK, the platform provides the satellite position data of more than five million freight trucks. LOGINK, "Tracking Data" (跟踪数据). Translation. <https://webcache.googleusercontent.com/search?q=cache:gXlrhu2J5iUJ:https://www.logink.cn/col/col173/index.html&cd=2&hl=en&ct=clnk&gl=us>.

[‡] Some of these indices are aggregated from enterprises but provided by a government platform, such as China's National Road Freight Transport Price Index System, which is maintained by MOT.

1. *Domestic standardization.* As international logistics was transitioning from analog to digital and becoming more streamlined in the mid-2000s, fragmentation of logistics processes was especially acute in China.¹³ To address this, numerous provinces had launched their own attempts to digitize truck fleet tracking and regulatory filings. LOGINK unified these concurrent efforts by standardizing document and data formats.¹⁴ In 2008, 15 provinces joined Zhejiang’s platform, and between 2009 and 2012 MOT established a plan to expand the platform nationally.¹⁵ As LOGINK evolved, it also developed functionalities enabling firms to submit various regulatory documents through a unified portal, rather than separately with different agencies and local governments throughout China.¹⁶
2. *Regional integration.* MOT developed LOGINK from a primary focus on tracking domestic truck fleets in China to encompass regional ocean shipping beginning in 2010 with its integration in the launch of the Northeast Asia Logistics Information-Sharing Network, or NEAL-NET.¹⁷ Established to promote logistics data exchange among China, Japan, and South Korea, NEAL-NET initially shared information on container ships in Ningbo-Zhoushan Port in Zhejiang Province; Tokyo-Yokohama Port, Japan; and Busan, Korea.¹⁸ By 2016, it had expanded to 11 Chinese ports, 5 Japanese ports, and 3 South Korean ports.¹⁹ Through integrating with NEAL-NET, LOGINK linked to public logistics platforms in Japan and South Korea, necessitating interoperable standards for exchanging bills of lading and other information.²⁰ Regional multilateral institutions further helped LOGINK and NEAL-NET grow their international footprint beyond the three participating countries. For instance, in 2013 the Asian Development Bank extended a \$400,000 grant used to employ outside experts, including European consultants who developed draft standards for LOGINK to submit to the International Organization for Standardization (ISO).^{* 21}
3. *International expansion.* In 2014, the year after BRI was launched, China’s central government made international logistics information exchange a policy priority in its Medium and Long-Term Development Plan for the Logistics Industry (2014–2020).²² MOT has since expanded LOGINK’s international purview considerably through partnerships with global ports, intergovernmental shipping organizations, and logistics companies. Following the 2014 plan, MOT and other Chinese agencies and firms also began participating in international standards development fora to improve the compatibility of LOGINK’s messaging and data formats with international intelligent transport system standards.²³ (See “China’s International Promotion of LOGINK” below.)

Going forward, MOT envisions LOGINK becoming even more of an integrated solution for all manner of commercial logistics needs. In a 2015 presentation on LOGINK to the UN Economic and Social Commission for Asia and the Pacific (UNESCAP), a researcher at MOT’s internal think tank indicated the platform would become a “Business Process as a Service” (BPaaS), a cloud-based software platform that allows users to manage numerous aspects of their business through one portal.²⁴ The next generation of LOGINK would offer a suite of software applications, such as partner lifecycle management, settlement with transport providers, and even contingency planning tools that allow users to project various future scenarios.²⁵ Such services would potentially put LOGINK in competition with many private sector firms, including U.S. freight forwarders, supply chain visibility platforms, and various logistics data analytics and enterprise resource planning (ERP) startups.

LOGINK Advances Key CCP Objectives

The development and international expansion of LOGINK advances several broader and overlapping Chinese policy initiatives, including BRI and the Digital Silk Road, China’s goal of becoming a transportation superpower, the “going out” of Chinese firms, and promotion of Chinese technical standards internationally.

- *BRI and the Digital Silk Road.* Often called CCP General Secretary’s Xi Jinping’s signature foreign policy initiative, BRI aims to create a global commercial and political order centered around China by financing and building infrastructure connecting the world to China.[†] Launched in 2013 with an initial focus on

* ISO develops and publishes interoperability standards used internationally. Headquartered in Geneva, Switzerland, it counts 166 member countries as of 2022. International Organization for Standardization, “Members.” <https://www.iso.org/members.html>.

† For more background on BRI, see “Belt and Road Initiative” in U.S.-China Economic and Security Review Commission, *2018 Annual Report to Congress*, 259–303. For more background on China’s attempts to influence global governance through BRI, see “The China Model: Return of the Middle Kingdom,” in U.S.-China Economic and Security Review Commission, *2020 Annual Report to Congress*, 80–135.

Eurasia and the Indo-Pacific region, BRI has now expanded to include economic corridors or passages on all continents. The Digital Silk Road is one such corridor, but rather than a specific geographic focus, it aims to foster export markets for Chinese tech firms and increase the adoption of Chinese technical standards and governance norms globally.²⁶ LOGINK's international expansion advances the goals of BRI and the Digital Silk Road in several respects. First, China's government is promoting LOGINK as a model for other countries to develop similar platforms and adopt LOGINK's standards, more deeply integrating their trade with China.²⁷ Second, connecting more BRI countries to LOGINK will allow China's government to access data on those countries' logistics systems, giving it greater visibility into and potential influence over global supply chains.²⁸ Third, Chinese logistics providers and related services will be more easily able to enter markets that have adopted Chinese technical standards (see "Promotion of Chinese technical standards" below).

- *Transportation superpower.* In 2019, the CCP and China's State Council issued a sweeping nine-point plan for China to become a world leader in domestic infrastructure, transportation equipment, and global connectivity by 2050.²⁹ LOGINK dovetails with two pillars of the plan in particular: (1) developing smart transportation systems, including setting standards in intelligent logistics networks, integrating smart warehouses into logistics platforms, and promoting BeiDou Satellite Navigation System, China's state-backed alternative to GPS; and (2) increasing China's maritime, rail, and air connection to international shipping hubs as well as China's influence in global governance related to international shipping.³⁰ Efficiency improvements in domestic transport from LOGINK are also vital to China's strategy to retain China's global manufacturing position, as the government hopes to offset rising factory wages by reducing logistics costs in the price of exports.³¹
- *Going out of Chinese firms.* Since the late 1990s, China's government has provided extensive support for Chinese firms, particularly state-owned enterprises (SOEs), to expand business beyond China's borders.³² LOGINK continues this trend in providing a government-funded platform that connects China to ports and other hubs throughout the world. In particular, LOGINK works with major Chinese SOEs, namely China Ocean Shipping Company (COSCO) and China Merchants Group, a logistics conglomerate under MOT that includes freight forwarder SINOTRANS and port operator China Merchants Port Holdings.³³ LOGINK also supports the expansion of nonstate e-commerce platforms and logistics companies beyond China's borders, for instance partnering with Alibaba and its logistics arm Cainiao to develop a blockchain bill of lading system.³⁴ Given MOT's vision for the platform to incorporate an array of cloud-based software applications, LOGINK could also become a vehicle for Huawei, Aliyun (Alibaba's cloud service), and other Chinese cloud providers to expand their international services.
- *Promotion of Chinese technical standards.* China's government aims to build export markets for Chinese goods and services by influencing technical standards-setting fora in ways that favor Chinese firms, consistent with its China Standards 2035 Strategy.^{*} Though logistics standards are mostly data and document formats and are seldom associated with high-value intellectual property,[†] their widespread adoption can still confer tremendous commercial advantages.³⁵ International ports' use of data exchange standards interoperable with LOGINK paves the way for Chinese logistics firms such as Cainiao and SINOTRANS to access new markets. Interoperability with Chinese services also helps expand China's

* China's 2035 strategy seeks to position Chinese firms and research institutes to set foundational rules governing next-generation technologies such as artificial intelligence, quantum information, and biotechnology. The plan itself is not public, but in October 2021 the CCP Central Committee and State Council released an outline of the strategy. According to the American National Standards Institute, a private nonprofit organization that oversees development of voluntary U.S. standards and conformity assessment and represents U.S. industry in standards-setting organizations, China has had roughly a 50 percent overall success rate in proposals submitted to ISO and thus far has not submitted many standards that align with the advanced technologies targeted in the outline. American National Standards Institute, "Comments of the American National Standards Institute on FR Doc. 2021-24090, Request for Information on the Study on People's Republic of China (PRC) Policies and Influence in the Development of International Standards for Emerging Technologies," *National Institute of Standards and Technology*, December 6, 2021, 9. <https://www.regulations.gov/comment/NIST-2021-0006-0013>.

† By contrast, technical standards for international telecommunications, such as the specifications for fifth-generation wireless (5G) devices, are associated with standard-essential patents. These provide the patent holder substantial licensing revenue, as any firm using the specification to design 5G devices must pay royalties on the underlying intellectual property. Qualcomm Incorporated, "Annual Report Pursuant to Section 13 Or 15(D) of the Securities Exchange Act of 1934 for the Fiscal Year Ended September 27, 2020," *U.S. Securities and Exchange Commission*, November 2, 2020, 12–13. <https://www.sec.gov/Archives/edgar/data/804328/000172894920000067/qcom-20200927.htm>.

export markets through cost and time savings. For example, streamlined logistics from a factory in China to a European wholesaler may make the difference between the wholesaler buying from China or from a supplier within the eurozone. Additionally, greater influence in intelligent logistics standards could also enable Chinese firms to make inroads in setting standards for adjacent technologies that have valuable intellectual property, like smart sensors and satellite positioning systems.³⁶

- *Potential access to and utilization of shipping, customs, and logistical data.* State control of the LOGINK platform potentially provides the CCP access to all data collected and stored on the platform. These data would enable the Chinese government to gain insights into shipping information, cargo valuations via customs clearance forms, and destination and routing information. This would provide considerable economic and intelligence insights for the government.

China's International Promotion of LOGINK

LOGINK has expanded its global remit considerably since China's government announced plans to promote the platform internationally in 2014. It has cooperation agreements with at least 24 ports, freeports, and port operators outside of China, including twelve in Asia, nine in Europe, and three in the Middle East (see Table 2). In addition to cooperation with ports and port operators, LOGINK's expansion has occurred through partnerships with major international logistics firms, both Chinese and non-Chinese, as well as participation in international organizations like UNESCAP. Among these are standards-setting bodies like ISO, which LOGINK is using to increase its ease of adoption in more advanced economies and to steer the direction of logistics development in emerging economies.

- *Cooperation with ports.* LOGINK's cooperation with ports and port operators has focused chiefly on sharing vessel and container status, improving the platform's ability to monitor cargo movement globally. Several of LOGINK's cooperation agreements are also explicitly intended to be footholds for regional expansion. A letter of intent with Port Klang in Malaysia notes the agreement is part of a broader effort to promote information exchange in ASEAN.³⁷ Similarly, a cooperation protocol with the Port of Sines and Algarve Authority in Portugal indicates information exchange and process streamlining is "a further step in reinforcing Sines as the Atlantic hub of the New Maritime Silk Road."³⁸ Both the agreement with Sines and an agreement with Maqta Gateway in Abu Dhabi—LOGINK's first in the Middle East—indicate that other countries see connectivity with LOGINK and visibility into Chinese port status as means to boost trade with China.³⁹ Aside from strengthening data exchange and trade ties, LOGINK's agreements with port operators in Odessa and Haifa include cooperating on the blockchain bill of lading system with Alibaba, noted above.⁴⁰

Table 2: LOGINK's Cooperation Agreements with International Ports*

Port	Year Cooperation Initiated	Notes
Tokyo-Yokohama, Japan	2010	Part of NEAL-NET
Busan, South Korea	2010	
Kawasaki, Japan	2012	
Osaka, Japan	2012	
Kobe, Japan	2012	
Incheon, South Korea	2012	
Gwangyang, South Korea	2012	
Yokkaichi, Japan	2015	
Niigata, Japan	2015	
Ulsan, South Korea	2015	
Pyeongtaek, South Korea	2015	
Klang, Malaysia	2017	Agreement indicates the exchange is intended to promote greater connectivity throughout ASEAN
Sines, Portugal	2017	Cooperation agreement references BRI
Barcelona, Spain	2017	

Abu Dhabi, United Arab Emirates (UAE)	2017	Cooperation agreement notes UAE intent to trade more with China
Antwerp, Belgium	2017	
Jebel Ali, Dubai, UAE	2017	Linked through Maqta Gateway, a port community system based in Abu Dhabi
Odessa, Ukraine	2018	Includes blockchain bill of lading initiative
Haifa, Israel	2018	Includes blockchain bill of lading initiative
Freeport of Riga, Latvia	2018	Also a sister port to Shenzhen
Ventspils, Latvia	2018	
Rotterdam, Netherlands	2019	Agreement mentions cooperation on standards
Hamburg, Germany	2019	
Bremen, Germany	2019	

* Cooperation includes agreements with port authorities and community system operators. For instance, LOGINK's cooperation with Rotterdam is facilitated by an information exchange agreement with Portbase, a port community system operator. Portbase, "Cooperation Agreement between Portbase and LOGINK," November 11, 2019. <https://www.portbase.com/en/cooperation-agreement-between-portbase-and-logink/>.

Source: Various.⁴¹

- *Partnerships with companies.* LOGINK partners with numerous Chinese firms, including SOEs and nonstate logistics startups, but a few key partnerships have vastly increased the platform's scope and access to data. Chief among these is a data sharing arrangement with CargoSmart, a shipping management software provider, signed in 2016.* After the agreement to exchange ship, booking, and customs data, domestic Chinese news sources reported that LOGINK had access to data on live movements of more than 90 percent of the world's container ships through CargoSmart.⁴² Another key partnership is LOGINK's integration with Cainiao, given its network of more than 200 warehouses globally.⁴³ In the past few years, Cainiao has focused on expansion in Europe, building a major hub at Liège Airport in Belgium; launching regional warehouses in Madrid, Paris, Bremen, and Rome and announcing plans for several more in late 2021; and establishing an intra-Europe trucking fleet and system of delivery lockers throughout Europe.⁴⁴ Where many of LOGINK's initial partnerships focused on conventional logistics (i.e., containers rather than parcels), information exchange with Cainiao provides LOGINK a comprehensive view of China's cross-border e-commerce transactions and transactions. In so doing, it positions LOGINK to adapt to changes in logistics services as the industry evolves to accommodate the rise of e-commerce and decline of traditional wholesale and brick and mortar retail.
- *Participation in international organizations and standards-setting bodies.* LOGINK's participation in well-established global fora appears aimed chiefly at increasing potential partners and joining standards-setting efforts to improve its interoperability with other platforms. In April 2022, it joined a proof-of-concept project that will link some 70 ports and 10 airports, allowing them to share vessel and container status. Participation in the project, called the "Network of Trusted Networks" and launched by International Port Community Systems Association (IPSCA), could more than double LOGINK's cooperation with global ports.[†] ⁴⁵ LOGINK is also contributing to an associated ISO standard for "visibility data interchange between logistics information service providers" currently under development.⁴⁶ In contrast to its participation in fora serving more advanced economies, China has tried to set the regional agenda for logistics standards development in Asia. For instance, from 2012 to 2016 the Chinese government funded

* CargoSmart is a subsidiary of Orient Overseas (International) Limited (OOIL), which was acquired by COSCO in 2018. COSCO Shipping, "OOIL Recorded a Net Profit Attributable to Shareholders for 2019 of US\$1.3 Billion and Its Recurring Net Profit Significantly Increased by 80% Year-on-Year," March 25, 2020. https://en.coscoshipping.com/art/2020/3/25/art_6923_152933.html.

† IPSCA is an international organization composed of port authorities, port community system (a type of platform for facilitating communication between public and private entities using the port) operators, and single window operators. Established in 2011 as a European economic interest grouping—an unincorporated not-for-profit association of entities working across borders in the EU—it counts 48 full members and four associate members as of September 2022. While most IPSCA members hail from Europe and North America, the organization expanded in 2014 to include operators from all other major regions around the globe. During this expansion, the association also began to participate in standards work with various UN bodies, the World Customs Organization, and ISO, among other standards-setting bodies. International Port Community Systems Association, "The History of IPSCA," 2021. <https://ipcsa.international/about/the-history-of-ipcsa/>; John Kerkhof, "Port Community Systems – Port Authority Perspectives, Challenges and Expectations," *IPSCA*, September 13, 2016. <https://erticonetwork.com/wp-content/uploads/2016/09/6.-John-Kerkhof-.pdf>.

a UNESCAP project on regional logistics integration. For the project, UNESCAP hosted a series of seminars, mostly in China, to showcase LOGINK and encourage other East Asian countries to build similar national logistics platforms and adopt LOGINK and NEAL-NET standards.⁴⁷ To date, Malaysia's Port Klang is the only East Asian port cooperating with LOGINK outside of NEAL-NET, but the UNESCAP project follows China's well-established strategy of coopting UN agencies and other international organization to advance the CCP's agenda.*

Potential Impact on U.S. Commercial and Security Interests

Widespread use of LOGINK could expand the Chinese government's power and influence and pose commercial and strategic risks to the United States. It could also threaten users' data security and position China to shape data governance norms in ways that run counter to U.S. interests.

Commercial risks

- LOGINK's aggregation of global commercial data could provide an informational edge, further enabling Chinese firms to compete on unfair footing. If LOGINK makes data on global transactions available to Chinese entities free or for less cost than it provides them to other users, or if it only provides certain data to Chinese entities, these entities may be able to act with an unfair advantage on international market trends ahead of other firms. For instance, if LOGINK tracked increasing export orders from a non-Chinese vendor for a product that Chinese planners had hoped to export more, the Chinese government could use the information to attempt to undercut the non-Chinese vendor. If LOGINK becomes a full-fledged marketplace, matching importers with exporters and logistics companies, it could also skew the data it provides to bias users toward selecting Chinese providers.
- The Chinese government's subsidization of LOGINK and LOGINK's partnership with Chinese firms, such as logistics provider Cainiao, could undermine the development of more innovative U.S. logistics technology companies.
- China's government may use insights gleaned from LOGINK to expand and more precisely target its use of economic coercion. Data aggregated through the platform may enable China to block or disrupt trade flows to countries or entities in retaliation for expressions of support for Taiwan, statements of opposition to China's repression of civil liberties in Hong Kong or mass detention of Uyghurs, and other opinions contrary to the CCP's official narrative.

Strategic risks

- Shipping information from sources like LOGINK could provide Chinese military planners with trends and early warnings for U.S. logistics, as the U.S. Department of Defense uses commercial transportation and ports around the world to ship military equipment. Commenting on BRI, a spokesman for the U.S. Transportation Command stated, "China is seeking to enhance its visibility into the global supply chain, including U.S. military logistics."⁴⁸
- Chinese control over shipping information in LOGINK could also enable Chinese military planners to conceal PLA actions and disrupt U.S. military operations. As U.S. Naval War College assistant professor Isaac Kardon explains, "If you control the information, you can move things around without others knowing, or jumble up someone else's information."⁴⁹

* For more on China's influence in the UN, see "The China Model: Return of the Middle Kingdom," in U.S.-China Economic and Security Review Commission, *2020 Annual Report to Congress*, 80–135. For a list of Chinese nationals in leadership position in international organizations, see U.S.-China Economic and Security Review Commission, "PRC in International Organizations," July 18, 2022. <https://www.uscc.gov/research/prc-international-organizations>.

- In their discussions of establishing “strategic strong points” or military support facilities abroad, Chinese military strategists consider “intelligence monitoring” to be one of six key lines of effort.^{*}⁵⁰ Depending on how LOGINK is configured, connects to port networks, and is managed, the platform could provide a source of data and surveillance in peacetime as well as vulnerability for the Chinese military to use to coerce or disrupt port operators during a crisis or conflict. In particular, visibility into global shipping data gained through LOGINK could enable the interdiction or disruption of U.S. operations or actions, including foreign military arms and munitions sales (such as to Ukraine or Taiwan), movement of U.S. military forces, or the sustainment of U.S. overseas strategic, military, intelligence, or other operations.

Data security risks

- The security of LOGINK is unclear, and the sponsorship of the platform by the state raises significant concerns. The platform could share data without users’ permission, including confidential business data. China’s 2017 Intelligence Law requires any Chinese citizen or organization to “support, provide assistance, and cooperate in national intelligence work,” suggesting the Chinese government could legally compel the platform to share data it deemed a matter of national intelligence.⁵¹ Moreover, the law forbids disclosing that any support was provided to Chinese intelligence services.⁵² Additionally, since at least 2015, CCP media and commissions have called for the inclusion of “reserved interfaces,” or backdoors, that could provide access to transportation, information, and communication infrastructure.⁵³ Even if the LOGINK platform is not intentionally set up to allow unauthorized access, Chinese software products provided by other vendors often show indications of insecure software development practices. For instance, a 2019 investigation of Huawei firmware and software by Ohio-based cybersecurity firm Finite State found hundreds of potential vulnerabilities.⁵⁴
- In gaining a bigger market share and taking an active role in standards-setting bodies, LOGINK is also positioning the Chinese government to have greater influence in data governance norms.[†] China’s promotion of LOGINK within Asia has been more assertive in attempting to steer regional development. The growing predominance of LOGINK and related technical standards may allow the Chinese government to advance its restrictive approach to data governance. Similarly, adoption of LOGINK in emerging economies may foster greater reliance on China-headquartered cloud computing services and other firms to provide digital infrastructure.

Considerations for Congress

China’s development and state sponsorship of a unified logistics management platform occurs in a global context that supports its rapid growth. Logistics data standards have moved to greater openness and exchange with technology improvements in satellite navigation, connected technologies, and cloud computing. There are clear benefits to this model: provided data is exchanged securely, ready communication between logistics partners improves efficiency, reduces transportation costs and emissions, and enables businesses and customers to anticipate and plan for disruption. However, the open system has evolved without considering control of data and information or the strategic implications of providing a global view of shipping routes and commerce to potential adversaries.

Given the CCP’s clear ambitions of increasing global reliance on China and reducing external dependence, the United States should be wary of embracing China’s unbridled participation in global logistics data exchange. Congress can help safeguard U.S. interests by identifying and addressing gaps in U.S. policy to respond to China’s

^{*} “Strategic strong points” are not limited to military bases and include overseas ports that may provide support for overseas military operations. In addition to intelligence monitoring, other lines of effort for these strong points are comprehensive replenishment, naval ship repair, maritime rescue, medical assistance, and maritime rights protection. Conor Kennedy, “Strategic Strong Points and Chinese Naval Strategy,” *China Brief*, March 22, 2019. <https://jamestown.org/program/strategic-strong-points-and-chinese-naval-strategy/>.

[†] For more on China’s data governance regime, see Emma Rafaelof, “China’s Evolving Data Governance Regime,” *U.S.-China Economic and Security Review Commission*, July 26, 2022. https://www.uscc.gov/sites/default/files/2022-07/Chinas_Evolving_Data_Governance_Regime.pdf.

promotion of LOGINK, raising awareness of its risks, and working with the executive branch to better understand its capabilities and development. The following considerations may merit congressional attention:

- The adoption of LOGINK by ports around the world could subject U.S. military logistics to more surveillance by Chinese intelligence and military operators, increasing the difficulty for U.S. Department of Defense planners to maintain secrecy in movements and constraining options for ports deemed safe from such surveillance.
- Information security requirements for U.S. facilities and businesses involved in logistics networks are limited in scope, are seldom binding, and do not address risks from aggregation of data across multiple sources. Current U.S. regulatory requirements for data and information security in U.S. ports focus on preventing unauthorized access to controlled networks but do not establish principles for transfer and storage of data or prescribe categories of sensitive data.* Chinese shipping firm COSCO, a LOGINK partner, currently operates terminals at Long Beach, Los Angeles, and Seattle, potentially granting LOGINK a window into vessel, container, and other data at those ports.⁵⁵ Additionally, the Port of Los Angeles is a member of IPSCA and may potentially share data with LOGINK through IPSCA's Network of Trusted Networks currently under development.⁵⁶
- China's subsidization and promotion of a nominally public good in a private market could undermine the dynamism of comparable U.S. services. The United States lacks tools to address market distortions from Chinese digital services. While antidumping and countervailing duties enable the United States to respond to subsidized goods, the U.S. government does not have comparable tools to respond to digital services offered when the price is below market value.
- The United States is engaged in a number of trade negotiations, including through the Indo-Pacific Economic Framework (IPEF). One of the pillars of the IPEF will include efforts to promote "trade facilitation," which would include steps to promote customs clearance and logistical streamlining. Congress may want to evaluate how the utilization of LOGINK by IPEF countries would impact U.S. interests.

* The Maritime Transportation Security Act of 2002 requires ports, vessels, and other maritime facilities to conduct threat and vulnerability assessments. U.S. Coast Guard guidelines suggest these assessments evaluate facilities' safeguards against unauthorized network access, but the guidance is nonbinding and does not encompass many threats posed by integration with LOGINK. U.S. Coast Guard, *Vessel and Navigation Inspection Circular No. 01-20*, February 26, 2020. https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/5ps/NVIC/2020/NVIC_01-20_CyberRisk_dtd_2020-02-26.pdf?ver=2020-03-19-071814-023.

Endnotes

- ¹ Donghyun Choi and Bomi Song, “Exploring Technological Trends in Logistics: Topic Modeling-Based Patent Analysis,” *Sustainability* 10:8 (July 2018). <https://www.mdpi.com/2071-1050/10/8/2810>.
- ² Transmetrics, “Guide to Supply Chain and Logistics Technology,” July 1, 2022. <https://www.transmetrics.ai/blog/supply-chain-logistics-technology-trends/>.
- ³ Patrick Sisson, “Robots Aren’t Done Reshaping Warehouses,” *New York Times*, July 12, 2022. <https://www.nytimes.com/2022/07/12/business/warehouse-technology-robotics.html>; Ludwig Hausman et al., “Startup Funding in Logistics: Focused Investment in a Growing Industry,” *McKinsey and Company*, June 6, 2022; Donghyun Choi and Bomi Song, “Exploring Technological Trends in Logistics: Topic Modeling-Based Patent Analysis,” *Sustainability* 10:8 (July 2018). <https://www.mdpi.com/2071-1050/10/8/2810>.
- ⁴ Gunjan Malani and, Sonia Mutreja, “Freight forwarding Market by Service (Transportation and Warehousing, Packaging and Documentation, Value-added Services), by Mode of Transport (Land Freight Forwarding, Sea Freight Forwarding, Air Freight Forwarding), by Customer Type (B2B, B2C), by End-Use Industry (Retail and E-Commerce, Manufacturing, Healthcare, Automotive, Others): Global Opportunity Analysis and Industry Forecast, 2021-2031,” *Allied Market Research*, July 2022. <https://www.alliedmarketresearch.com/freight-forwarding-market>; Valuates Reports, “Freight Forwarding Market is About 186 Billion USD in 2021, It Will Mark a CAGR of 3.3% in the Forecast Years till 2028 - Valuates Reports,” *PRNewsire*, June 20, 2022. <https://www.prnewswire.com/in/news-releases/freight-forwarding-market-is-about-186-billion-usd-in-2021-it-will-mark-a-cagr-of-3-3-in-the-forecast-years-till-2028-valuates-reports-822788695.html#:~:text=Global%20Freight%20Forwarding%20market%20size,the%20forecast%20years%20till%202028.&text=One%20of%20the%20key%20growth,increase%20in%20international%20trade%20volumes>; Fortune Business Insights, “The global third party logistics market is projected to grow from USD 976.2 billion in 2021 to USD 1,701.2 billion in 2028 at a CAGR of 8.26%.” <https://www.fortunebusinessinsights.com/third-party-logistics-market-105802>; Grand View Research, “Third-party Logistics Market Size, Share & Trends Analysis Report By End Use (Manufacturing, Automotive), By Service (DTM, ITM, VALs), By Transport (Roadways, Airways), By Region, And Segment Forecasts, 2022 – 2030.”
- ⁵ United Nations Economic and Social Commission for Asia and the Pacific Committee, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016, 4–7. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>; LOGINK, “National Transportation and Logistics Public Information Platform: Large-Scale Enterprise Platform Access General Integration Project” (国家交通物流公共信息平台:大型企业平台接入总集成项目), *China Federation of Logistics and Purchasing*, November 19, 2015. Translation. <http://webcache.googleusercontent.com/search?q=cache:4JnQKIq1Mp8J:www.chinawuliu.com.cn/xsyj/201511/19/307151.shtml+&cd=1&hl=en&ct=clnk&gl=us>.
- ⁶ United Nations Economic and Social Commission for Asia and the Pacific Committee, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016, 4. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
- ⁷ United Nations Economic and Social Commission for Asia and the Pacific Committee, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016, 13. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>; Gu Jingyan, “National Transport and Logistics Information Platform in China LOGINK,” *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 11, 15. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
- ⁸ Gu Jingyan, “National Transport and Logistics Information Platform in China LOGINK,” *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 11, 15. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
- ⁹ Mihai-Cosmin Niculescu and Marius Mineab, “Developing a Single Window Integrated Platform for Multimodal Transport Management and Logistics,” *Transportation Research Procedia* 14 (2016). <https://doi.org/10.1016/j.trpro.2016.05.219>.
- ¹⁰ National Transportation and Logistics Public Information Platform Catalogue of Logistics Public Information Data Resource V2018 (国家交通运输物流公共信息平台 物流公共信息数据资源目录 V2018). <https://www.logink.cn/attach/0/6ffb9e3671fb49b3b8d34c950dbed9b3.pdf>; United Nations Economic and Social Commission for Asia and the Pacific, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
- ¹¹ *China Economic Times*, “Investigation on the Construction of LOGINK” (国家交通运输物流公共信息平台建设调查), November 28, 2016. Translation. http://webcache.googleusercontent.com/search?q=cache:iAMrBeC9qg4J:www.sohu.com/a/120128452_468661.
- ¹² Gu Jingyan, “National Transport and Logistics Information Platform in China LOGINK,” *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 33. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
- ¹³ Feng Lei, “Create the ‘Strongest Brain’ of National Logistics Information” (打造国家物流信心 “最强大脑”), *Guangming Daily*, December 8, 2016. Translation. http://webcache.googleusercontent.com/search?q=cache:LLOFFBs-h2kJ:www.gov.cn/xinwen/2016-12/08/content_5144855.htm+&cd=1&hl=en&ct=clnk&gl=us.
- ¹⁴ Feng Lei, “Create the ‘Strongest Brain’ of National Logistics Information” (打造国家物流信心 “最强大脑”), *Guangming Daily*, December 8, 2016. Translation. http://webcache.googleusercontent.com/search?q=cache:LLOFFBs-h2kJ:www.gov.cn/xinwen/2016-12/08/content_5144855.htm+&cd=1&hl=en&ct=clnk&gl=us.
- ¹⁵ United Nations Economic and Social Commission for Asia and the Pacific Committee, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016, 130–134. <https://www.unescap.org/resources/regional->

- study-use-logistics-information-systems-increased-efficiency-and-effectiveness*; Ministry of Transport of the People's Republic of China, *Ministry of Transport: The Top-Level Design of LOGINK Has Been Launched*, (交通运输部: 国家物流信息共享平台启动顶层设计) July 12, 2012. Translation. https://web.archive.org/web/20220907165918/http://www.gov.cn/gzdt/2012-07/12/content_2181523.htm.
- ¹⁶ Gu Jingyan, "National Transport and Logistics Information Platform in China LOGINK," *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 18. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
 - ¹⁷ United Nations Economic and Social Commission for Asia and the Pacific Committee, "Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness," July 4, 2016, 130–134. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
 - ¹⁸ Kerri Ahn, "The Northeast Asia Logistics Information Service Network," *United Nations Economic and Social Commission for Asia and the Pacific*, April 2017. https://www.unescap.org/sites/default/files/Session%203-3.%20Kyeong-rim%20Ahn_GPANS%20SmartLo.pdf.
 - ¹⁹ Kerri Ahn, "The Northeast Asia Logistics Information Service Network," *United Nations Economic and Social Commission for Asia and the Pacific*, April 2017. https://www.unescap.org/sites/default/files/Session%203-3.%20Kyeong-rim%20Ahn_GPANS%20SmartLo.pdf.
 - ²⁰ United Nations Economic and Social Commission for Asia and the Pacific Committee, "Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness," July 4, 2016, 130–134. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
 - ²¹ Asian Development Bank, "People's Republic of China: Formulation of the Northeast Asia Logistics Information-Sharing Network Development Program and Organizational Mechanism," June 2017. <https://www.adb.org/sites/default/files/project-documents/47067/47067-001-tcr-en.pdf>.
 - ²² State Council of the People's Republic of China, *Medium and Long-term Development Plan for the Logistics Industry (2014-2020)* (物流业发展中长期规划 (2014—2020 年)), October 4, 2014. Translation. http://webcache.googleusercontent.com/search?q=cache:5TWW_qzNr7YJ:www.gov.cn/zhengce/content/2014-10/04/content_9120.htm&cd=1&hl=en&ct=clnk&gl=us.
 - ²³ Asian Development Bank, "People's Republic of China: Formulation of the Northeast Asia Logistics Information-Sharing Network Development Program and Organizational Mechanism," June 2017, 1. <https://www.adb.org/sites/default/files/project-documents/47067/47067-001-tcr-en.pdf>; Gu Jingyan, "National Transport and Logistics Information Platform in China LOGINK," *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 30. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
 - ²⁴ Gu Jingyan, "National Transport and Logistics Information Platform in China LOGINK," *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 33. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
 - ²⁵ Gu Jingyan, "National Transport and Logistics Information Platform in China LOGINK," *United Nations Economic and Social Commission for Asia and the Pacific*, December 10, 2015, 33. <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.
 - ²⁶ Robert Greene and Paul Triolo, "Will China Control the Internet through the Digital Silk Road," *SupChina*, May 8, 2020. <https://carnegieendowment.org/2020/05/08/will-china-control-global-internet-via-its-digital-silk-road-pub-81857>.
 - ²⁷ United Nations Economic and Social Commission for Asia and the Pacific Committee, "Activities Implemented under the Regional Action Programme for Transport Development in Asia and the Pacific, Phase II (2012-2016)," November 9, 2016, 22-23. https://www.unescap.org/sites/default/d8files/event-documents/MCT3_INF.4_rev.pdf; United Nations Economic and Social Commission for Asia and the Pacific Committee, "Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness," July 4, 2016, 1, 220. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
 - ²⁸ Andre Wheeler, "Global Smart Supply Chain Integration: Is a Trap Being Laid with the Logink Platform?" *Asia Power Watch*, August 26, 2021. <https://asiapowerwatch.com/global-smart-supply-chain-integration-is-a-trap-being-laid-with-the-logink-platform/>.
 - ²⁹ Chinese Communist Party Central Committee and State Council, *Logistics Superpower Construction Plan* (《交通强国建设纲要》), September 19, 2019. Translation. http://webcache.googleusercontent.com/search?q=cache:WUS1w0i1QNEJ:www.gov.cn/zhengce/2019-09/19/content_5431432.htm+&cd=1&hl=en&ct=clnk&gl=us.
 - ³⁰ Chinese Communist Party Central Committee and State Council, *Logistics Superpower Construction Plan* (《交通强国建设纲要》), September 19, 2019. Translation. http://webcache.googleusercontent.com/search?q=cache:WUS1w0i1QNEJ:www.gov.cn/zhengce/2019-09/19/content_5431432.htm+&cd=1&hl=en&ct=clnk&gl=us; Jordan Wilson, "China's Alternative to GPS and its Implications for the United States," *U.S.-China Economic and Security Review Commission*, January 5, 2017. https://www.uscc.gov/sites/default/files/Research/Staff%20Report_China's%20Alternative%20to%20GPS%20and%20Implications%20for%20the%20United%20States.pdf.
 - ³¹ Liu Zhiqiang, "Logistics Cost Cuts and Traffic Tricks" (物流降成本, 交通出实招), *People's Daily*, October 16, 2018. Translation. http://webcache.googleusercontent.com/search?q=cache:IZ_DkaCe-3AJ:www.gov.cn/zhengce/2018-10/16/content_5331083.htm+&cd=1&hl=en&ct=clnk&gl=us; Lizhi Xu et al., "A Study on Transport Costs and China's Exports: An Extended Gravity Model," *Journal of Systems Science and Complexity* 30:6 (December 2017): 1–2. <https://link.springer.com/article/10.1007/s11424-017-5191-z>.
 - ³² *Xinhua*, "[One Hundred Moments Say One Hundred Years] 1996, 'Bring In' and 'Going Out' Strategy" (【百个瞬间说百年】1996, “引进来”和“走出去”战略), December 8, 2021. Translation. http://webcache.googleusercontent.com/search?q=cache:iDU8-_9ysm0J:www.news.cn/politics/2021-12/08/c_1211478976.htm; Andrew Szamoszegi and Cole Kyle, "An Analysis of State-Owned Enterprises and State Capitalism in China," *Capital Trade, Incorporated* (prepared for the U.S.-China Economic and Security Review Commission), October 26, 2011, 89–90. https://sites.utexas.edu/chinaecon/files/2015/06/US-China-Commission_State-Owned-Enterprises-and-State-Capitalism.pdf.

- ³³ LOGINK, “Partners, Global Cooperation” (合作伙伴 国际合作)]. <http://www.logink.cn/col/col43/index.html>.
- ³⁴ Gavin van Marle, “Alibaba Signs Up and Gives Port Community's eB/L Initiative a Boost,” *Loadstar*, June 19, 2020. <https://theloadstar.com/alibaba-signs-up-and-gives-port-communitys-eb-l-initiative-a-boost/>; LOGINK, “Partners, Global Cooperation” (合作伙伴 国际合作)]. <http://www.logink.cn/col/col43/index.html>.
- ³⁵ See, for instance, International Organization for Standardization Technical Committee 204, “ISO 24533-2:2022 Intelligent Transport Systems — Electronic Information Exchange to Facilitate the Movement of Freight and Its Intermodal Transfer — Part 2: Common Reporting System,” May 2022. <https://www.iso.org/standard/79905.html>; Jorge Contreras, “National Disparities and Standards-Essential Patents: Considerations for India,” in Ashish Bharadwaj, Vishwas Deviah, and Indraneth Gupta, eds., *Complications and Quandaries in the ICT Sector: Standard Essential Patents and Competition Issues* (September 2017) (pre-publication draft), 3. <https://dc.law.utah.edu/cgi/viewcontent.cgi?article=1034&context=scholarship>.
- ³⁶ See, for instance, International Organization for Standardization Technical Committee 204, “ISO/AWI 22086-2 Intelligent Transport Systems (ITS) — Network Based Precise Positioning Infrastructure for Land Transportation — Part 2: Functional Requirements and Data Interface via Nomadic Device.” <https://www.iso.org/standard/76969.html?browse=tc>; Daniel Broderick, “Intellectual Property and Licensing in the Commercial Space Age,” 2020 IEEE Aerospace Conference, August 21, 2020. 6. <https://trs.jpl.nasa.gov/bitstream/handle/2014/51103/CL%2320-0048.pdf?sequence=1>; Jorge Contreras, “National Disparities and Standards-Essential Patents: Considerations for India,” in Ashish Bharadwaj, Vishwas Deviah, and Indraneth Gupta, eds., *Complications and Quandaries in the ICT Sector: Standard Essential Patents and Competition Issues* (September 2017) (pre-publication draft), 3. <https://dc.law.utah.edu/cgi/viewcontent.cgi?article=1034&context=scholarship>.
- ³⁷ LOGINK, “Platform History.” <https://webcache.googleusercontent.com/search?q=cache:GzEn3vdWS4kJ:https://www.logink.cn/col/col39/index>.
- ³⁸ Port of Sines Authority, “Port of Sines and LOGINK Sign Protocol in China,” November 2, 2017. <https://web.archive.org/web/20200119144059/https://www.apsinesalgarve.pt/en/news/2017/port-of-sines-and-logink-sign-protocol-in-china/>.
- ³⁹ Maqta Gateway, “Maqta Gateway Signs Cooperation Agreement with LOGINK in China,” November 13, 2017. <https://web.archive.org/web/20211018173724/https://www.maqta.ae/maqta-gateway-signs-cooperation-agreement-with-logink-in-china/>; Port of Sines Authority, “Port of Sines and LOGINK Sign Protocol in China,” November 2, 2017. <https://web.archive.org/web/20200119144059/https://www.apsinesalgarve.pt/en/news/2017/port-of-sines-and-logink-sign-protocol-in-china/>.
- ⁴⁰ International Port Community Systems Association, “Logistics Visibility Task Force Initiates New Blockchain Project,” June 6, 2020. <https://ipcsa.international/wp-content/uploads/2020/08/Logistics-Visibility-Task-Force-Final-Press-Release-18-06-2020.pdf>.
- ⁴¹ **General:** Zhang Zhongyuan, “Case Studies of Infrastructure Connectivity Building,” *Routledge Handbook of the Belt and Road*, 2022, 571–576. DOI:10.4324/9781003286202; Emily de La Bruyère and Nathan Picarsic, “Beijing’s Innovation Strategy: Threat-Informed Acquisition for an Era of Great Power Competition,” Proceedings of the Seventeenth Annual Acquisition Research Symposium at the Naval Postgraduate School SYM-AM-20-091, April 28, 2020, 14. <https://dair.nps.edu/bitstream/123456789/42511/SYM-AM-20-091.pdf>; LOGINK, “Platform History.” <https://webcache.googleusercontent.com/search?q=cache:GzEn3vdWS4kJ:https://www.logink.cn/col/col39/index>; **NEAL-NET:** Gu Jingyan, “Regional Logistics Information Sharing NEAL-NET,” NEAL-NET, December 10, 2015, 28-35. <https://www.unescap.org/sites/default/files/11%20-%20NEAL%20NET.pdf>; Northeast Asia Logistics Information-Sharing Network, “NEAL-NET’s Approach to Facilitate Logistics Network in the Sub-Region,” October 2012, 21. https://www.unescap.org/sites/default/files/Session2-3_Kim.pdf; Northeast Asia Logistics Information-Sharing Network, “A Introduction of NEAL-NET,” June 13, 2012, 28. <https://www.unescap.org/sites/default/files/8.Intro-of-NEAL-NET.pdf>; Northeast Asia Logistics Information-Sharing Network, “Shared Services Open Port List.” https://english.neal-net.net/art/2017/6/29/art_1891_40717.html. **Others:** “LOGINK Was Invited to the Netherlands and Germany to Carry Out International Logistics Information Exchange” (中国交通通信信息中心受邀出访荷兰和德国开展国际物流信息互联共享合作), November 13, 2019. Translation. https://www.sohu.com/a/353665743_99921063; Portbase, “Cooperation Agreement between Portbase and LOGINK,” November 11, 2019. <https://www.portbase.com/en/cooperation-agreement-between-portbase-and-logink/>; Liu Xiaoming, “Promoting Pragmatic Cooperation in Sea Ports Along the Belt and Road,” June 15, 2018. <http://ceec-china-maritime.org/wp-content/uploads/2018/07/promoting-pragmatic-cooperation-in-sea-ports-along-the-belt-and-road-2.pdf>; Maqta Gateway, “Maqta Gateway Signs Cooperation Agreement with LOGINK in China,” November 13, 2017. <https://web.archive.org/web/20211018173724/https://www.maqta.ae/maqta-gateway-signs-cooperation-agreement-with-logink-in-china/>; Port of Sines Authority, “Port of Sines and LOGINK Sign Protocol in China,” November 2, 2017. <https://web.archive.org/web/20200119144059/https://www.apsinesalgarve.pt/en/news/2017/port-of-sines-and-logink-sign-protocol-in-china/>.
- ⁴² Feng Lei, “Create the ‘Strongest Brain’ of National Logistics Information” (打造国家物流信心 “最强大脑”), *Guangming Daily*, December 8, 2016. Translation. http://webcache.googleusercontent.com/search?q=cache:LLOFFBs-h2kJ:www.gov.cn/xinwen/2016-12/08/content_5144855.htm+&cd=1&hl=en&ct=clnk&gl=us; CargoSmart, “Big Schedules Mobile App.” <https://www.cargosmart.com/en/solutions/mobile.htm>.
- ⁴³ Cainiao, “Cainiao Network Overview,” September 2016, 3. <https://webcache.googleusercontent.com/search?q=cache:WYwZ2PMXqBEJ:https://www.alizila.com/wp-content/uploads/2016/09/Cainiao-Factsheet.pdf%3F95431&cd=1&hl=en&ct=clnk&gl=us>.
- ⁴⁴ *Post and Parcel*, “Cainiao ‘Contributing to the Growth of Europe’s Logistics Ecosystem,’” October 20, 2021. <https://postandparcel.info/143750/news/e-commerce/cainiao-contributing-to-the-growth-of-europes-logistics-ecosystem/>; *Asia Cargo News*, “Cainiao Launches European Parcel Sorting Centers to Boost Efficiency,” October 13, 2021. <https://www.asiacargonews.com/en/news/detail?id=5786>.

-
- ⁴⁵ IPSCA, “LOGINK signs up to IPCSA’s Network of Trusted Networks,” April 11, 2022. <https://ipcsa.international/news/2022/04/11/logink-signs-up-to-ipcsas-network-of-trusted-networks/>; Jack Donnelly, “IPSCA Launches the Network of Trusted Networks,” *Port Technology*, July 1, 2020. <https://www.porttechnology.org/news/ipcsa-launches-the-network-of-trusted-networks/>.
- ⁴⁶ Roxanne Oclarino, “Keeping Up with Logistics,” *International Organization for Standardization*, November 30, 2021. <https://www.iso.org/cms/%20render/live/en/sites/isoorg/contents/news/2021/11/Ref2767.html>.
- ⁴⁷ United Nations Economic and Social Commission for Asia and the Pacific Committee, “Activities Implemented under the Regional Action Programme for Transport Development in Asia and the Pacific, Phase II (2012-2016),” November 9, 2016. https://www.unescap.org/sites/default/d8files/event-documents/MCT3_INF.4_rev.pdf; United Nations Economic and Social Commission for Asia and the Pacific Committee, “Regional Study: The Use of Logistics Information Systems for Increased Efficiency and Effectiveness,” July 4, 2016, 8, 130, 218-220. <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.
- ⁴⁸ Daniel Michaels, “China’s Growing Access to Global Shipping Data Worries U.S.,” *Wallstreet Journal*, December 20, 2021. <https://www.wsj.com/articles/chinas-growing-access-to-global-shipping-data-worries-u-s-11640001601>.
- ⁴⁹ Daniel Michaels, “China’s Growing Access to Global Shipping Data Worries U.S.,” *Wallstreet Journal*, December 20, 2021. <https://www.wsj.com/articles/chinas-growing-access-to-global-shipping-data-worries-u-s-11640001601>.
- ⁵⁰ Conor Kennedy, “Strategic Strong Points and Chinese Naval Strategy,” *China Brief*, March 22, 2019. <https://jamestown.org/program/strategic-strong-points-and-chinese-naval-strategy/>.
- ⁵¹ Samantha Hoffman, written testimony before the House Permanent Select Committee on Intelligence, *Hearing on China’s Digital Authoritarianism: Surveillance, Influence, and Political Control*, May 16, 2019, 3. <https://www.congress.gov/116/meeting/house/109462/witnesses/HHRG-116-IG00-Wstate-HoffmanS-20190516.pdf>.
- ⁵² Samantha Hoffman, written testimony before the House Permanent Select Committee on Intelligence, *Hearing on China’s Digital Authoritarianism: Surveillance, Influence, and Political Control*, May 16, 2019, 3. <https://www.congress.gov/116/meeting/house/109462/witnesses/HHRG-116-IG00-Wstate-HoffmanS-20190516.pdf>.
- ⁵³ Pointe Bello, “Beijing’s Backdoors into Infrastructure Technology Have a Name...and a Far-Reaching Purpose,” February 2020. <https://www.pointebello.com/insights/reserved-interfaces>.
- ⁵⁴ Finite State, “Finite State Supply Chain Assessment: Huawei Technologies Co., Ltd.,” June 2019, 2. <https://info.finitestate.io/hubfs/Collateral/Finite%20State%20Supply%20Chain%20Assessment-%20Huawei%20Technologies.pdf>.
- ⁵⁵ COSCO Shipping, “Terminals.” <https://na.coscoshipping.com/terminals>.
- ⁵⁶ Emily de La Bruyère and Nathan Picarsic, “Beijing’s Innovation Strategy: Threat-Informed Acquisition for an Era of Great Power Competition,” Proceedings of the Seventeenth Annual Acquisition Research Symposium at the Naval Postgraduate School SYM-AM-20-091, April 28, 2020. <https://dair.nps.edu/bitstream/123456789/4251/1/SYM-AM-20-091.pdf>.