

Bhutan NDI Applications in Digital Governance and Economy

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In February 2023, His Royal Highness the Gyalsey became the first digital citizen of Bhutan when he onboarded on the Bhutan National Digital Identity (NDI) platform.¹ This symbolic gesture represented a major step forward for the nation, ushering in a new era of digital connectivity. A secure and reliable digital identity system not only recognises the importance of technology but also ensures efficiency in governance, public infrastructure, service delivery, and the national economy at large.

With the national rollout of Bhutan National Digital Identity, the vision inspired by His Majesty the King to leapfrog a technology revolution by pioneering emerging technologies² like the blockchain, Internet of Things (IoT), and artificial intelligence, has found concrete footing. This aspiration received global recognition with Bhutan NDI being awarded the best innovation in “Identity and Data” at the 19th edition of the Mobile Ecosystem Forum Summit held in Barcelona, Spain in February 2024.³

Background

The Government Technology (GovTech) Agency (the then Department of Information Technology under the then Ministry of Information and Communication), launched an integrated government-to-citizen (G2C) service portal in 2010.⁴ The G2C project, aimed at creating effective e-governance (e-gov) under the Accelerating Bhutan’s Socio-Economic Development (ABSD) programme, was designed to deliver over 200 government services to the citizens with ease and efficiency.⁵

1 Kuensel. “HRH The Gyalsey Becomes First Digital Citizen” (2023).

2 Bhutan Broadcasting Services. “Use Technology to Solve Problems: His Majesty’s Address to RIM Graduates” (2019).

3 Bhutan NDI. “Bhutan NDI Wins Award for Innovation in Identity & Data at the Mobile Ecosystem Forum 2024” (2024).

4 Bhutan Transparency Initiative, “Public Service Delivery Assessment Report” (2015).

5 Dorji, Sithar. “E-government initiatives in Bhutan: Government to Citizen (G2C) service delivery initiative – A case study.” (2012).

The G2C portal was meant to be a catalyst for digital public infrastructure in Bhutan, streamlining processes and improving remote access for citizens. However, enhanced efficiency of processes came with numerous challenges, including lack of digital trust and data privacy in online service delivery for citizens with already low digital literacy and connectivity problems.

Remote access through the G2C portal required citizens to disclose personal identifiable information (PII), at times not necessary for the said interaction. Further, the online portals presented possibilities of data leaks and, consequently, data breaches.

If users were to, for instance, mistype a single digit of their citizenship identity (CID) number during the security clearance application process, they were presented with the personal details of other citizens. Similar cyber concerns have existed across e-gov web portals. In the context of public services, this can have serious repercussions, especially when it relates to healthcare records, tax information, insurance, and other financial details. Therefore, ensuring that this data is handled securely and ethically is highly important in maintaining digital trust.

In an effort to address these challenges and develop a secure identity verification process for all digital interactions, the GovTech Agency launched the National Digital Identity (NDI) project in 2021. With the guidance of His Majesty the King, NDI was designed as the foundation for the Digital Druklyul Flagship Programme.⁶

The Agency kicked off the NDI project by initiating a biometric collection drive⁷ in collaboration with the Desuung Organisation⁸ and assigned the product development work to Druk Holding and Investments (DHI)⁹. Going beyond the objective of streamlining public service delivery, the scope of the NDI project was broadened to include the digital inclusion of citizens and residents in governance and economy.

6 Office of the Prime Minister and Cabinet. "Flagship Programmes" available at https://www.pmo.gov.bt/?stm_service=flagship-programs#1591395633204-99e137a4-961c

7 Kuensel. "Nationwide biometric collection for secure online identity" (2021).

8 www.desuung.org.bt/

9 www.dhi.bt

Laying the Foundation for a Trust-Driven Digital Drukyul

Grounding Bhutan NDI in a legal context, the National Digital Identity Act 2023 received the Royal assent in July 2023, making Bhutan the first sovereign nation to adopt a comprehensive decentralised digital identity framework.¹⁰ Driven by the philosophy of Self-Sovereign Identity (SSI)¹¹, Bhutan NDI aims to create a thriving digital ecosystem in Bhutan that is rooted in trust. While identity has always been the cornerstone of every trusted digital interaction between individuals and public and private service providers, Bhutan NDI's decentralised approach to the exchange of identity information puts digital privacy at the heart of all such interactions.

So, what does decentralisation really mean in a digital identity model and how does it improve privacy and security? Bhutan NDI's decentralised technology has been designed in such a way that users' verifiable credentials (identity-related proofs, personal details, certificates, etc.) are not controlled by one central authority. As a result, no single entity has complete control over the users' personal data. Rather, these credentials are issued to the user by different authorities and stored solely in the users' Bhutan NDI edge¹² wallet.

Each of these credentials consists of various attributes on the Bhutan NDI wallet. For example, the Foundational Identity (ID) credential consists of a citizen's name, CID number, household number, date of birth, and gender as its attributes. The users have complete control over each of their credentials and can share only those attributes - even if they were issued by different authorities - required for a specific digital transaction.

To put this in perspective, a user of Bhutan NDI may share their name, date of birth, and CID number issued by the Department of Civil Registration and Census (DCRC) and mobile number issued by TashiCell to apply for a driver's licence without disclosing other attributes of the same Foundational ID credential, like household number issued by DCRC. Thus, data sharing

10 Bhutan Broadcasting Services. "Bhutan Adopts NDI Act", 31 July 2023.

11 To learn more: Preukchat, Alex et al. "Self-Sovereign Identity", (New York: Manning Publications Co., 2021)

12 Edge technology allows devices to locally collect and process data closer to where it's being generated, either by the device itself or a local server. To learn more, visit: <https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-edge-computing>

is on a need-to-know basis as opposed to the current practice of submitting a copy of the CID card with no user control over the attributes that are disclosed while accessing services.

Adding another layer of security, the users' personal data cannot be found on Bhutan NDI's server or on a third-party cloud server. All data transfer between the user and the service provider happens through an encrypted peer-to-peer channel. Thus, the absence of the users' PII data on Bhutan NDI's central repository or a cloud server, reduces the possibility of a single point of large-scale attack through phishing¹³, man-in-the-middle¹⁴, and other such cyber threats that impact the entire digital ecosystem or chain.

Consent-driven and privacy-preserving, Bhutan NDI is thus designed as a highly secure platform that facilitates trusted interaction between all participants (individuals, government, private and corporate organisations) of Bhutan's digital ecosystem.

Envisioning a Thriving Digital Economy

Bhutan, with its rugged geography and uneven internet network distribution, continues to face difficulty with connectivity. Despite a mobile penetration rate of 100%¹⁵ and an internet penetration rate of 85.6%¹⁶, there is a significant digital divide between residents of rural and urban areas, especially when it comes to accessing public and private services online.

While the establishment of 101 community centres as the frontline for G2C service delivery was completed during the 10th Five Year Plan, between 2008 and 2013, their effectiveness in rural areas has been mired by

13 A cyber crime that aims to trick the recipient of email, text message, or phone call into falling for the attacker's desired action, such as revealing financial information, system login credentials, or other sensitive information. Learn more at: <https://www.proofpoint.com/us/threat-reference/phishing>

14 A cyber crime where an attacker interrupts an existing conversation or data transfer between the user and an application, intercepting information and data from either party. Learn more at: <https://www.veracode.com/security/man-middle-attack>

15 Helgi Library (2021) "Mobile Phone Penetration (As % of Population) in Bhutan" available at <https://www.helgilibrary.com/indicators/mobile-phone-penetration-as-of-population/bhutan/>

16 Statista (2021) "Internet Penetration Rate in Bhutan from 2011 to 2021" available at <https://www.statista.com/statistics/767603/internet-penetration-rate-bhutan/>

a lack of advocacy and awareness.¹⁷ Further aggravating the situation, there exist multiple bottlenecks in the established bureaucratic processes, legacy systems, and the wider digital public infrastructure that hinder service delivery. Citizens continue to travel far and wide to access public services, if at all.

However, Bhutan NDI, as an app available on smartphones—and soon to be introduced in light-weight feature phones—is poised to seamlessly integrate into people’s daily lives. With NDI in place, citizens will be presented with unprecedented access to a wide range of services from their homes, transcending geographical barriers.

In the ever-evolving technological landscape, the successful implementation of the national digital identity (NDI) system will facilitate a wide range of economic and social activities for citizens, businesses, and government organisations. As has been the trend, Bhutan NDI is likely to witness a steady pace of adoption in the coming months.¹⁸ Citizens both within and outside the country continue to onboard on the platform to digitally get their Foundational ID and Permanent Address credentials and use these further for secure passwordless login to access services digitally available through the G2C portal, book mobile sim card online, and receive academic credentials from the Royal University of Bhutan (RUB).

As service providers continue to integrate with the Bhutan NDI platform, other services in finance, insurance, healthcare, taxation, utility, etc. will also be made accessible to citizens with the Bhutan NDI app, providing users with a secure and integrated digital experience across platforms. With such potential for seamless connectivity, NDI can serve as the foundation of a vibrant digital economy and robust public and social infrastructure, as has been envisioned by His Majesty.

Bhutan NDI will not only enable the delivery of efficient and citizen-centric public services but will also streamline other essential services in education, healthcare, social welfare, taxation, and finance. Currently, Bhutan NDI’s roadmap presents citizens with a promise of remote accessibility to services

17 United Nations Development Programme. “Evaluation Report of G2C Project: Enhancing Government to Citizen Service Delivery Initiative; Connecting the remote areas of Bhutan through e-Governance Project” (2013).

18 Lhamo, Sherab. “More Bhutanese Embrace National Digital Identity”, Kuensel, 25 January 2024.

provided through the Electronic Patient Information System (ePIS), Bhutan Online Land Tax System (BOLTS), Electronic Registration and Licensing Information System (eRALIS), among many other public services. Further, by incorporating a digital identity verification process, private organisations too will witness a significant reduction in administrative burden and experience enhanced customer satisfaction.

As the NDI Act 2023 puts all interactions between digital participants within a legal framework, Bhutan NDI will help mitigate the risk of fraud and corruption while raising trust in digital transactions. Corporations and small and large enterprises can, therefore, remotely onboard customers by taking advantage of Bhutan NDI's automated electronic know-your-customer (eKYC) offering aligned with the Royal Monetary Authority's regulations around Anti-Money Laundering (AML) and Countering Financing of Terrorism (CFT),¹⁹ while keeping cybersecurity measures intact.

Going beyond digital trust between the current players of the economy, Bhutan NDI also paves the way for the proliferation of innovative digital services. Passwordless login and peer-to-peer connection features of the Bhutan NDI platform allow both organisation and individual-level interactions and service delivery. This will enable trusted economic activities for small-scale social media influencers and digital freelancers and also facilitate large-scale fintech solutions, over-the-top (OTT) entertainment consumption, e-commerce market access, etc. This secure and interoperable digital identity ecosystem thus has the potential to establish a dynamic and interconnected economy, driving entrepreneurship, job creation and economic growth.

Looking Ahead

As the first nation in the world to provide citizens with Self-Sovereign Identity, the vision for Bhutan's digital economy now stands resolute alongside an inclusive, resilient, and future-focused society. By empowering citizens with a legally recognised digital identity, Bhutan NDI has opened possibilities for trusted cyber activities in an era when identity theft and fraud, credential stuffing, etc. overshadow digital interactions.

¹⁹ Royal Monetary Authority of Bhutan. "Anti-Money Laundering and Countering Financing of Terrorism Rules and Regulations", (2022).

As the Bhutan NDI-based digital ecosystem expands, citizens and residents will benefit from the opportunities for collaboration, innovation, and greater economic participation. Citizens' digital identity, accessed through their personal devices from any location, has laid the foundation for a vibrant digital ecosystem. This new era thus initiates a transformative journey for the nation, impacting both governance and the economy.

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