

# Imagining Mobility with Beckn

Concept paper



## Urban Mobility challenges warrant ecosystem thinking

The world is rapidly becoming more urban and will witness a staggering increase in urban mobility demand soon. For a long time, cities have been built around vehicles and less around people. This approach continues to add stress on the infrastructure, environment and economy of a city.

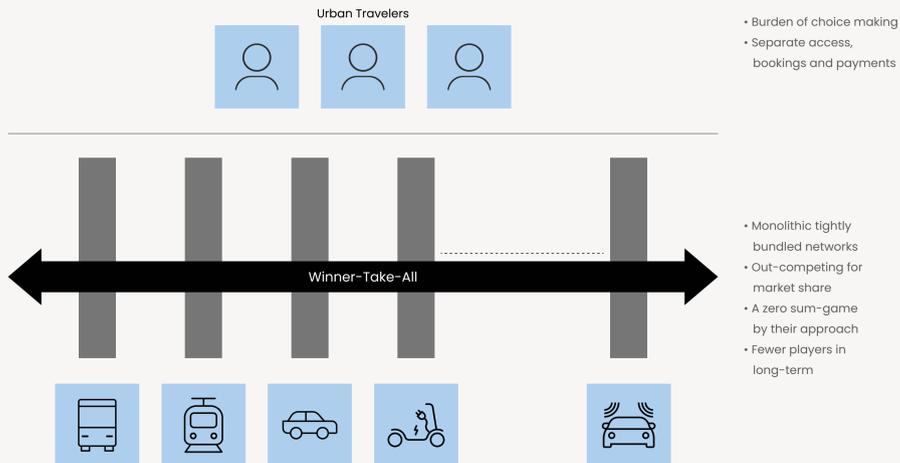
Public mass-transit systems today find themselves competing not just with personal vehicles but also with new forms of shared mobility. Private shared mobility is continuously evolving in form and scale. But despite the increase in available choices, personal vehicles continue to remain the primary mode of transport for many. The networks of public and private shared mobility operators do not seem to offer a compelling alternative for many city travellers. While public transport, especially the rail systems & buses on dedicated lanes, seem to get through the distance faster, their accessibility and availability is a challenge in many cities. Private shared mobility networks, on the other hand, do not always cater to all customer segments. The mobility systems in cities thus remain isolated, offering no effective solutions for a seamless journey door-to-door. And the race towards a winner-take-all scenario among the operators has further reduced the trust required to combine their efforts towards integrated mobility.



By 2050, 68% of world's population will live in cities and urban mobility demand will more than double

Sources: World Urbanization Prospects 2018: Highlights (United Nations), ITF Transport Outlook, 2018 (OECD)

### Increasingly fragmented | Isolated competing networks | Many journeys in a journey



The big shifts happening in electrification, autonomous and connected vehicles technologies could expand the gap between the operators further, especially between the on-demand mobility service providers and the mass transit systems. The question that remains to be asked is whether these technology shifts help reduce congestion on the roads by any significant measure.



**Electrification**  
TCO (\$/mile) attractiveness for EV taxi based on mileage



**Autonomous**  
Passengers sharing on robotaxis should make it price competing with public transport



**Connectivity**  
The averagely driven car will churn out 4,000 GB of data per day



**Shared Mobility**  
Ridesharing looks more promising than public transport

The basic purpose of mobility is to reach from one place to another effectively. This need transcends the physical form of transport, especially when no one form offers to fulfill this basic purpose at a population scale. While choices based on comfort, safety, costs are important, such choices today undermine the basic purpose of mobility. No one agency or one form of mobility can ever solve the mobility problems of the city. The problem warrants a different approach.

## How do we bring everyone together to deliver mobility that cities need?

Large scale problems warrant thinking "what works at scale" instead of "scaling what works". The scale and complexity of urban mobility require a wider ecosystem approach. Cities increasingly need a convergent mobility system that offers integrated mobility services that can fulfill the basic purpose of mobility, but with diverse forms enabling more choices for urban travellers.

The mobility service providers have built their business and technology systems in a way that is self-contained and independent. Every provider strives to be individually customer-centric using their independent monolithic systems. They have built their own access channels, payment options and trip-fulfillment capabilities. These are not naturally designed to work with other mobility service providers. Lack of such interoperability hinders an inter-modal journey with smooth planning, scheduling and payment experience among other things.

Cities, therefore, need to answer the following questions today.

" How do we create an environment that is trust-enhancing and barrier-reducing, especially in the context of integrated mobility? "

" Is it possible to collaborate, co-innovate while staying competitive? Can we create a win-win instead of a zero-sum game? "



Further, city governments need to provide an environment for trust, fair and transparent policies that enable collaboration, inclusiveness and promote voluntary participation on the integrated mobility agenda. All this while allowing operators to remain competitive in offering better value to customers as independent networks.



If cities can offer more rides to service providers, as a significant addition to what each can generate on their own, then it acts as an incentive for them to participate in the integrated mobility efforts. However, it is important to ensure that service providers retain their autonomy. The current paradigm of integrating everything onto a platform does not augur well for the latter. A platform today implies a concentration of control and warrants governance mechanisms that may not always inspire confidence among the participants. What if instead, the integration can be done without a central platform? The key is in creating a public digital infrastructure that is fundamentally non-exclusive and non-rivalrous by design.

The World Wide Web is a great example of a public digital infrastructure. It continues to rapidly change the way society, governments and businesses across the world operate. What if the Web was not designed as a public digital infrastructure? What if the Web was just a closed platform or set of closed platforms? The commercial platforms built over the internet are not open or at least as open as the web itself. The key difference that separates platform thinking from the public digital infrastructure one is the intent behind its design.

GPS is another shining example of public digital infrastructure that any agency or business can harness. It has enabled innovation to flourish and not kept it confined to few. The Web and GPS are examples of how open specifications can super-charge innovation for societal good. Is it possible to create something similar that allows ecosystem participants to voluntarily adopt for their own benefit and for the collective benefit of all?

# Design of Beckn

Beckn's approach to enabling an open networked economy is much like the Internet and less like a Stock Exchange which is also an open marketplace for buyers and sellers of securities but with a more centralised governance. The Internet reference made here is specific to the Internet as a packet communication infrastructure and not to the World Wide Web that runs on top of it, as also popularly referred to the Internet that includes both the application service - the Web itself and the underlying packet communication infrastructure.

## What is Beckn?

It is a common way for discovery and engagement between users of large and diverse number of consumer and providers platforms



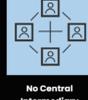
A set of open specifications for interoperable micro-services



Consumer Centric



Provider Autonomous



No Central Intermediary



Open API Specs



Distributed Architecture



Form & Tech Agnostic

The design of Beckn is therefore inspired by the key design principles of the Internet: .

## Openness

Beckn specifications are not private and proprietary but made open under Creative Commons license and the Foundation intends to build an open community around Beckn for its continuous evolution in the future. Openness is not just towards the use of specifications, but also towards the ability to extend, adapt and contribute back to the process of open specifications development, across the dimensions of architecture, APIs, data and governance.



## Interoperability

Beckn brings an ecosystem of market participants together with a set of interoperable specifications. Interoperability is achieved through standardisation of the various specifications that form the Beckn Protocol and at the same does not assume or standardise a form of technology to implement them. Beckn protocol is a set of technology-agnostic specifications that allows the applications on Beckn to exchange information in a standardised manner irrespective of the technology form or medium of exchange. The initial specification of Beckn assumes JSON over HTTP to enable Beckn network over the Web, but does not restrict it from adopting other technologies or technology protocols.

## Redundancy

Beckn adopts a distributed architecture that allows the exchange of messages between sender and receiver is routed through any of the different nodes (called Beckn Gateway, see "Beckn Ecosystem") allowing redundancy as a key feature of the architecture.



## End-to-end principle

Beckn's architecture realises a network among the end-user/participants with no centralised intelligence. Instead the intelligence, influence and control are distributed to the end-users and the network by itself is not governed by one agency. This is the key feature of Beckn and acts as a departure from the conventional platform-centric digital commerce approach.



## Layered Design

Beckn allows higher-level applications / application services to be built on Beckn. Beckn at its core is a comprehensive but generic digital commerce protocol that can be extended into sector-specific applications like mobility using Beckn compliant schemas of that sector (see "Beckn Specification Layers"). Beckn unbundles the experience layer from the packet transmission layer of machine-readable commerce messages exchanged between the end-participants. Beckn enables the creation of additional layers like one for transmission of policies governing the Beckn network implemented by a specific market or a region and creation of an open transaction ledger on the network.

# Design features of Beckn

## Beckn ecosystem

The market ecosystem of consumers and providers can be on the Beckn open network as end-beneficiaries with each of them implementing their end of the Beckn protocol APIs. The demand side and supply side digital interfaces and systems exchange and interact the way similar to how such end-points on the Web interact using HTTP. The HTTP client application sends a request via Internet nodes to reach the destination and the destination routes the response back to the client using similar nodes on the Internet. These nodes act as routing utilities. In case of Beckn, the consumer side or demand side search and order requests are generated and sent using consumer interface applications, identified as "Beckn Apps" to routing utilities called "Beckn Gateways" who in turn relay the request to the provider interface applications identified as "Beckn Providers". "Beckn Providers" respond with service details that can fulfill the consumer order requests.

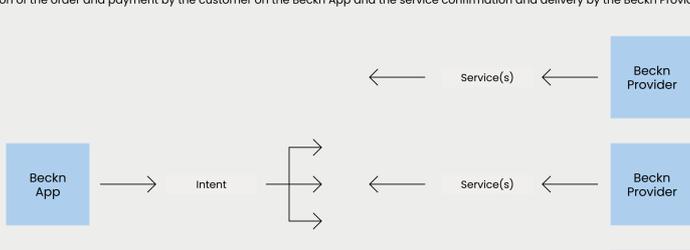
This approach of Beckn proposed here does not mandate Beckn to become the only arrangement for the provision of commercial services in the cities. It is complementary to the individual efforts of service providers who can choose to continue with their existing model and infrastructure to offer their services to the users. Some may find it beneficial to offer their services only via Beckn. Beckn Protocol is a shared resource among the participants in a region or market, with the regional government setting up the enabling policies for its adoption. Beckn uncovers several opportunities for all the participants - customers, Beckn Providers (BP), City government, Beckn Apps Providers and even infrastructure providers as Beckn Gateway Providers (BG).



## Beckn Interaction

The key part of interaction between the Beckn App and Beckn Provider is the standardised request and response message structure. It is similar to a HTTP Request and HTTP Response structure but built specifically for commerce in case of Beckn. The same in Beckn core schema is called Beckn Intent and Beckn Service.

The Beckn Intent messages capture the users requirements for search and ordering a commerce service over the Beckn network. Beckn Providers respond to the intent by responding with their relevant Service or Service(s). The Intent and Service specifications are standardised generic message structures that can be further adopted by sectors to prepare sector specific Intent and Service message schemas. The Services offered as response to the intent shall subsequently lead to the interactions for selection, confirmation of the order and payment by the customer on the Beckn App and the service confirmation and delivery by the Beckn Provider.



## Beckn Specification Layers

As explained earlier, the Beckn provides a generic set of APIs and Core Schema (data structure) that can be extended to fit the sector specific requirements. Applying the principle of layered design, the Beckn Core Schema provides easy extensibility to the higher level application categories like Mobility, Final Mile Delivery, Restaurants and Healthcare businesses. The higher level application category schemas shall use the core schema guidelines open to customise and expand the schema further to handle the sector specific requirements of interoperability. Beckn specifications include features like open registries, form-agnostic data elements & structure with concerns of security and privacy addressed in the design

Mobility Schema	Final Mile Delivery Schema	Food Schema	Grocery Schema
Beckn Core Schema	Beckn Core Schema	Beckn Core Schema	Beckn Core Schema
Beckn APIs	Beckn APIs	Beckn APIs	Beckn APIs

The Foundation shall encourage participation and active contribution from the open community to evolve the schemas at both core level and the higher level application level categories.

Please visit <https://developers.becknprotocol.io> for more information on the Beckn specifications.

In summary, Beckn acts as an open digital infrastructure that is shared publicly among all participants obviating the need for a central platform, central control or authority to enable commerce interactions among the participants. Each participant, by virtue of implementing their end of the protocol APIs, naturally becomes part of the Beckn network and becomes discoverable at their own command. Beckn is not a platform or an app. It's an open protocol specification, that allows fair and transparent rules of play for the market participants. It works like a digital infrastructure. It enables policy adoption on it but doesn't prescribe or influence policies for creating and operating the open playground enabled over Beckn.

## How does Beckn unlock value in Mobility?

### Beckn for city travellers

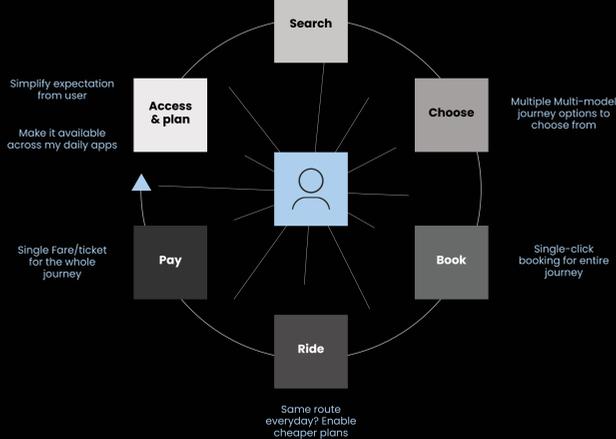
Today's hyper-connected urban customers have high expectations from digital services. It is not unnatural for them to have similar expectations from mobility services too.

With Beckn, it would be possible to offer a seamless booking for the entire journey across many modes. Beckn can offer a smooth payment and booking experience, despite the nuances and variation in the same with individual BP's booking and fulfillment experience. Cities can shift from form-specific mobility to customer-centric mobility.

This may not be sufficient to nudge users towards shifting to shared mobility as a habit, but it sets an opportunity for the ecosystem to innovate on service offerings (from Beckn Apps, BPs or other market players) that may incentivise this shift further. It offers an opportunity to make the mobility services more accessible by making them reach the customer online where they are (in their daily use apps and interfaces) instead of making customers come to where the service is (through BP's specific user apps or a MaaS app).



### Seamless mobility experience



Apart from the basic purpose of reaching one's destination, Beckn enables customers to explore a more customised contextual service by recognising the higher-order purposes of mobility. There could be user-specific contexts (shared with user consent) enabled for their mobility needs. The city planners, government and BPs, using Beckn, can 'listen' to the needs of diverse user groups coming through the mobility network. They can then accordingly design new and relevant customer services for such segments by an agency or a collection of agencies, enabling co-innovation.

## Beckn for Government

### Building an innovation ecosystem around Mobility

Cities can use Beckn to enable creation of an integrated mobility network in a way that allows the city to localise the integrated mobility agenda catering to its specific needs.

#### Beckn as Digital Rails

Just as how railroads boost the economy of the region, Beckn as 'digital rails' can stimulate the digital economy around mass transit systems. Using Beckn, cities can quickly enable an integrated ecosystem around their public transportation networks to address the first and last-mile challenges. City governments and their public transport authorities do not have to expend much effort to engage and integrate with each private mobility player. By enabling its services on Beckn APIs, it would allow any private BP to integrate with them instantly, without the need for public transit operators to be on their platform or on any third-party platform. Beyond the basic integration of mobility services around them, it can stimulate more layers of innovations that can be built on and around mass transit platforms.



#### Open trustworthy real-time data for an effective and smart urban planning

The data and analytics this can generate would be potentially more effective than sourcing 'second-hand' open data, towards evidence-based planning with specific insights obtained from aggregated origin-destination journey data, traffic infrastructure. This can be used for optimising efforts and leverage the existing investments better, discover and avoid unnecessary capital expenditure on mobility. Optimisation of bus fleet, route optimisation, route-wise 'cost of access', bus stops, parking spaces, new metro lines, peak and off-peak metro capacity (wagons), ticketing terminals capacity optimisation, etc are but a few examples that could be directly explored with the data generated using Beckn.



#### Restoring agency to fleet owners and operator

The governments, world over, are realising the impact of the mobility economy in its current form on the taxi operators and fleet owners. With Beckn mobility, it enables these mobility micro-entrepreneurs to be on-boarded digitally at significantly lower cost. By simply making the fleet go online, it becomes discoverable for ride hailing across many user apps using Beckn APIs, with little or no cost of customer acquisition.

#### Enabling smart and real-time policymaking

As city government evaluates and introduces policy framework to deal with the imminent shifts in Mobility and evolving new forms of mobility, it could use Beckn protocol to introduce, test and validate policy measures real-time by releasing "policies as a machine-readable code". This offers cities to avoid taking a short-sighted binary "Ban/fully Allow" approach towards new mobility models. It can issue instant policy communication translating into dynamic real-time controls for the related BPs using Beckn protocol.

#### Open Data sharing as a natural derivative of collective participation

Cities today are constantly at tug-of-war with BPs to receive mobility data in return for their business in the cities. As much as the data is critical for the city's mobility and urban planning, they recognise the BP's need to withhold data to stay competitive. While data could be separated, and aggregated at several layers to enable sharing, it does still create friction in the data-sharing arrangements between BPs and Cities. And the privacy of end-user data from being protected is only making the situation more complex to deal with. With Beckn however, the explicit need for seeking data from BPs, and the BPs unwillingness to share data is overcome to an extent by making clean authentic data (stripped of agency and user-specific information) as a natural derivative from the transactions on Beckn protocol, of the participants engaging to access more rides. Therefore, generating more rides due to collective action is a natural quid pro quo for offering access to relevant data.

## What does it mean for private Beckn Providers?

### Reduce cost of doing mobility business, apply more capital towards innovation

Apart from the implications and potentials explained earlier, a BP could use Beckn to generate more rides on its platform at low costs. One of the biggest impediments to a digital mobility entrepreneur is the discoverability of its services by its prospective customers and the high cost of customer acquisition. BPs can offset this cost onto the ecosystem and focus on being competitive on its services – drive its innovation and differentiation agenda. Generating rides, not acquiring customers, becomes the primary agenda. For small and early-stage mobility entrepreneurs, the ability to quickly launch and scale up their business is high due to the reduced cost of accessing demand.

### Rapid market expansion for share mobility services

When integrated mobility is naturally accessible from mainstream user interfaces, BPs can look at converting many travellers into shared mobility users in little time and effort at a fraction of the cost. In cities where congestion is a daily norm and parking spaces are limited, the ease of access to single door-to-door journey makes it a compelling option for travellers. It will significantly augment the current efforts of BPs reaching out to them on their own.



### Unlock more value from decoupled components of its business

BPs can unlock value from their own platform by decoupling their monolithic platform into many asset-worthy components. These components can be just the platform itself as a service without worrying about running fleet and operations, or just independently commercialising its Routing algorithm component. By offering these components as a commercial offering to other players in markets where they have no interest or agency to operate. Using Beckn, the BPs can 'white-label' their capabilities and offer them seamlessly to other agencies for additional revenues.

### Enable other service offerings to drive more fare and non-fare revenue agenda

Beckn protocol allows new service providers outside of Mobility businesses like insurance, delivery, healthcare and entertainment to look at the mobility business in a whole new way. The reduced time to market on Beckn-enabled networks opens the possibility for layered innovation. BPs can benefit from the natural enablement of non-mobility services on top of their own. This creates value to be shared by both parties in the form of more rides or more non-fare revenues.



## What does it mean for Beckn Apps?

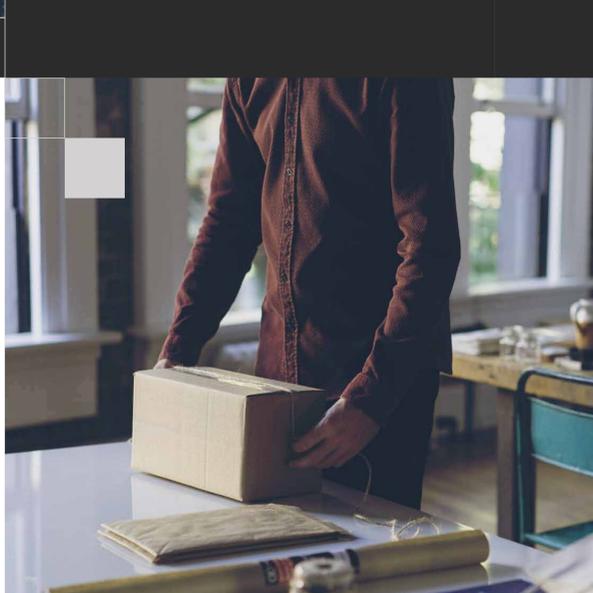
Consumer businesses who are looking for ways to engage and transact more with their users could have a way to access highly vital and high-volume mobility services without having to formally engage with the BPs. Further, they can build on this to offer newer or bundled services that are relevant to their users. Given the ease of implementing the lightweight protocol that Beckn is, big platforms can see this as an opportunity to harness more value from its large and active customer base.

## Mobility using Beckn in a nutshell

Beckn protocol offers the possibility to set up a Win-Win based co-operation predicated on voluntary participation from all the players in the ecosystem. It creates a natural incentive aligned to their respective goals. All this using light-weight open API specifications.

- Minimal, standardized, easy to execute
- Ecosystem-based design
- Mode-agnostic Taxonomy
- Enable policy/law as a code
- Configurable by region
- Allows innovation on demand & supply sides

Beckn in summary acts as a launch-spec for a city to design and deploy an integrated mobility network, with an easy-to-execute role for every ecosystem actor. Beckn provides cities the ability to design its integrated mobility networks catering to its specific needs.



A collective Intention to build an open digital world.

Join us on Discord. Link below:

<https://bit.ly/JoinBoc>