



WHITE PAPER

Strengthening the Health and Growth of India's E-commerce in an open network

Network observability: An approach to scale in an unbundled environment,
enhance interoperability and uncover actionable insights

Executive Summary	3
Objective	4
Focus Areas of Network Observability Framework	4
Context	4
Network Observability	5
Overview	5
Design Principles	7
Network Observability Framework	7
Interim Solution: Automated System	15
The Long-term solution: Locker Box + Self-monitoring System	16
Usage and benefits of Network Observability	19
Network Observability from ONDC perspective	19
How Network Observability helps Network/Ecosystem Participants	19
Applicability across Sectors	20
Data Governance	21

Executive Summary

The primary aim of this paper is to present a comprehensive framework for Network Observability within the context of the Open Network for Digital Commerce (ONDC). The framework defines an approach for network and ecosystem participants to collectively observe the growth and health of the network, foster interoperability, enhance transparency, trust, and operational efficiency. It outlines the importance of Network Observability metrics, their definition, calculation, and computation, and emphasizes on the advantages of standardizing and observing these metrics.

The paper describes the shift from a platform-centric model to a decentralized network. It stresses on the significance of a participative and minimalistic approach to observability, meant for uncovering actionable insights to drive inclusivity and scale in the digital economy. Furthermore, the paper highlights that the Network Observability Framework is a versatile tool applicable to various industries and sectors for improving business operations. It encompasses telemetry, data analytics, and operational aspects, making it suitable for both single-entity and multi-party ecosystems. It also addresses how its benefits can extend to various sectors like healthcare, transport, agriculture, OTT platforms - to name a few.

The ONDC network is democratising the digital commerce industry, therefore more new-to-commerce entities are joining the network as participants and learning about it for the first time. In such public initiatives with a population-scale impact, the significance of Network observability becomes critical. For instance, in the case of the ONDC network, it is enabling a unique unbundled, asynchronous, and interoperable working model for various entities engaging in digital commerce. With an open network, the biggest challenge is ensuring that all participants are not impacted due to any disruption at one participant's end and there is no technical latency due to any malicious or non-malicious error both technically and business wise. In the initial high growth phase, the vulnerability to and impact of such events is much higher. Concept of Network observability, therefore, would help provide a common vocabulary for multiple stakeholders to collaborate and cater to the need of the network seamlessly. It will help to enhance transparency across network and ecosystem participants in the short term by helping them understand efficient ways of working over the network, develop self-correction capabilities, and derive insights to evolve processes and offerings for scale in the long term.

The implementation of Network Observability involves information exchange through ONDC network APIs to enable technical and business health by identification of anomalies, root causes, and areas for improvement to enhance the buyer experience, seller experience and overall network performance. By establishing an intelligence layer, aggregate-level insights can be surfaced, revolutionizing digital commerce at scale. Automated alert engines can also be deployed to identify network participants in need of support, enabling them to focus on critical issues.

Role of ONDC in enabling network observability for the ONDC network has been explained in great detail in this paper. How it will shape up to empower existing and new network participants to grow in the near term and how it will provide network level intelligence at an aggregate, anonymized level in the long term.

Objective

The aim of this paper is to present a comprehensive explanation of Network Observability (NO) within the context of the ONDC network, covering both its implementation approach in the short-term and the long-term.

This paper explores the definition, usage, and benefits of establishing a set of Network Observability metrics. It offers insights for developing guidelines that facilitate the creation of an environment enabling participants to uncover actionable insights and progressively scale in an unbundled setting.

Focus Areas of Network Observability Framework

- Establishing a foundational framework for network participants to observe metrics, insights, action, and feedback.
- Creating a common vocabulary that promotes collaboration among multiple stakeholders and addresses the network's requirements.
- Developing an ecosystem that empowers all participants to provide services on the network while maintaining fairness and inclusivity.
- Identifying new use cases and diverse domains with varying levels of complexity that require innovative approaches to drive digital commerce at a population scale.
- Providing guidelines to different types of network or ecosystem participants, enabling them to take appropriate actions to enhance the network's strength.

Context

Digital commerce in India is experiencing remarkable growth and is recognized as one of the fastest-growing sectors globally. This growth has been driven by technological advancements and predominantly led by a few organizations. However, there exists a polarization in the marketplace due to the requirement of specific technical skills and the dominance of well-established monopolies.

To foster inclusive growth, Open Network for Digital Commerce (ONDC) is facilitating a shift from an operator-driven monolithic platform-centric model to a facilitator-driven, interoperable decentralised network. By leveraging digital commons in the form of an open protocol, which is essentially a non-code open specification, ONDC aims to establish an interoperable open network that unlocks the untapped value within the digital commerce ecosystem.

Given the collaborative nature of this initiative, various participants are expected to work together to ensure the growth and vitality of the network. These network participants play a crucial role in building a robust ecosystem and unlocking a realm of possibilities.

While the protocol primarily focuses on enabling digital transactions, it's important to acknowledge that certain aspects of a complete transaction, such as physical products, packaging, pick-up, delivery, and returns, have physical components. Each commerce transaction encompasses both online and offline spaces within an interoperable and unbundled

ecosystem. Therefore, transparency of information becomes essential to facilitate successful transactions.

With each successful transaction and satisfied buyer & seller, trust in the network strengthens. Trust acts as a catalyst, attracting more buyers and participants to engage on the network, thereby promoting inclusivity in the digital economy at a large scale.

As the network and protocols continue to evolve, ensuring trust and remaining inclusive at scale becomes crucial. To address this, ONDC has introduced the concept of "Network Observability," drawing insights from other digital public infrastructure (DPIs) such as UPI or Aadhaar in India. To institutionalise the concept of Network Observability, ONDC had scheduled multiple sessions and workshops with industry experts and Network Participants. This concept enables insight generation and evaluation to ensure that the network progresses in the right direction, maintains inclusivity, accommodates new participants, fosters innovation, and remains trustworthy on a population scale.

Network Observability

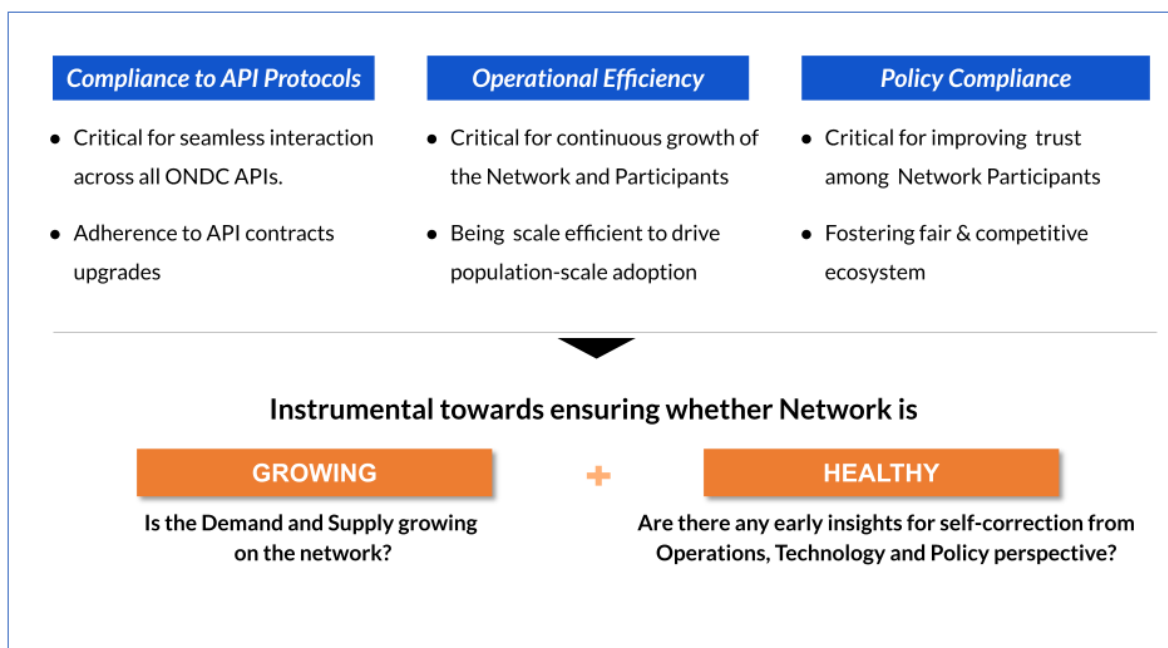
Overview

Network Observability is a framework to observe business and technical health of the network to uncover actionable insights. Its core objective is to enhance interoperability, transparency and trust among network / ecosystem participants on the ONDC network by facilitating them to develop self-correction capabilities and evolve to scale in an unbundled environment. It addresses following network level modalities for the network participants:

- **Unbundled:** *With a common vocabulary for multiple stakeholders to collaborate and cater to the needs of the network seamlessly.*
- **Asynchronous:** *Network that enables autonomy in operations across stakeholders, creating asymmetry among NPs impacting operational efficiency.*
- **Participant Centric:** *Ecosystem that empowers all participants to stay fair and inclusive while providing services on the network.*
- **Diverse:** *Use cases and varied domains with different levels of complexity requiring innovation to drive digital commerce at population scale.*

The framework assists in ensuring that all participants operating on the network possess a common understanding of the network's growth and health by identifying key metrics and standardizing their definitions. It facilitates adherence to API protocols, allows for observation and enhancements in operational efficiency, and promotes compliance with network policies.

Figure 1: Need for Network Observability



Design Principles

It's important that there is a strong foundation setup with the help of principles that allow only relevant information to flow transparently across participants while protecting the rights of each participant to maintain their unique selling propositions and keep growing their business. Therefore, ONDC's network observability framework has been designed to keeping in mind following design principles:

Figure 2: Design Principles

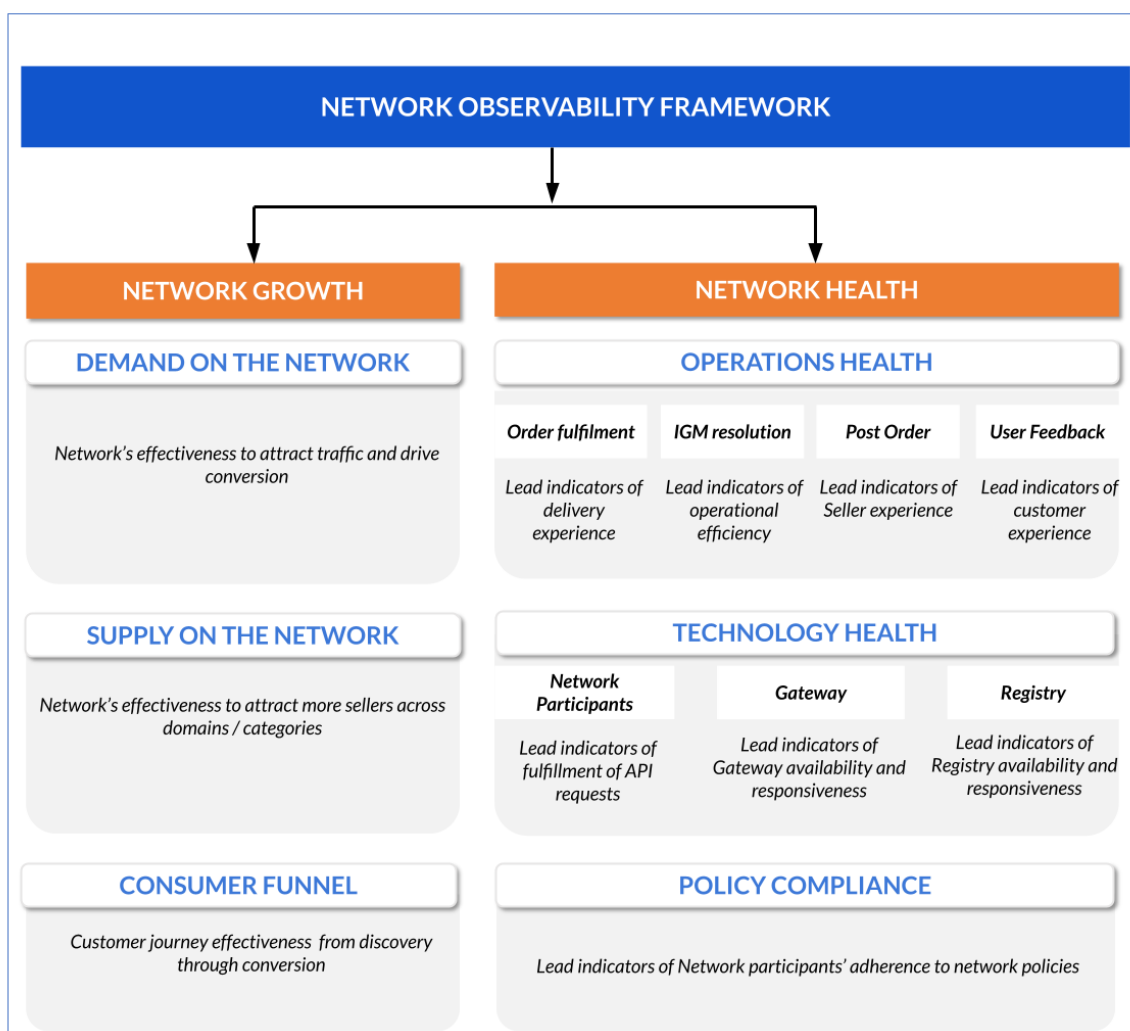
- ***Minimalist Approach***
- ***Participative, not coercive***
- ***Network as a cooperative of Network Participants***
- ***ONDC as a facilitator for Protocols and frameworks***
- ***Identity-less & Non-sensitive, business metrics***
- ***Anonymized, Network Participants level technical metrics***
- ***Standardised format for Publishing***

Network Observability Framework

The framework is designed to empower participants to self-monitor their performance using both aggregate and participant-specific metrics, while maintaining interoperability within the unbundled environment of the ONDC network. It also allows for the contribution of insights from third-party agencies, providing an outside-in perspective to gain a deeper understanding of consumer behaviour, participant perception, and pain points.

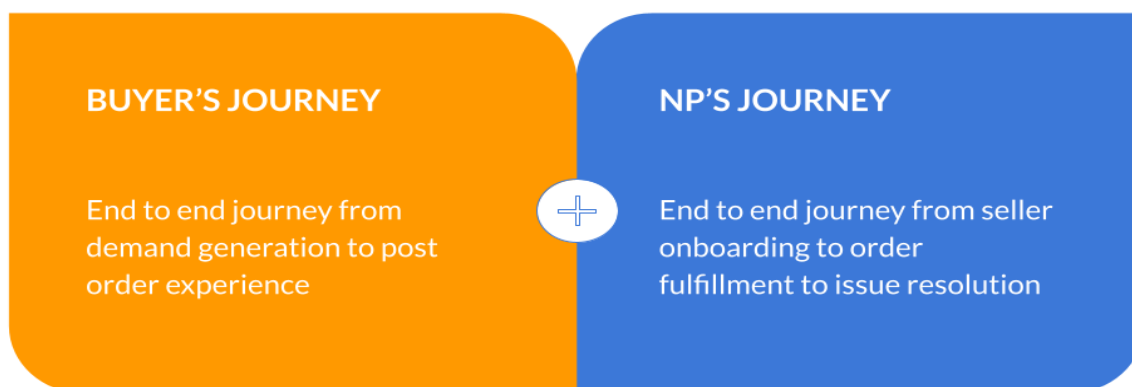
This framework serves as a tool for network and ecosystem participants to observe and derive actionable insights. It aims to minimize information asymmetry and duplication, thereby accelerating the scale and health of the network. The diagram below illustrates the network observability framework. The framework has been carefully designed to offer comprehensive guidance on establishing observability metrics that cover various aspects of a digital commerce journey within the context of an open network.

Figure 3: Network Observability Framework



Observability framework has been derived from 2 user journeys on the network:

Figure 4: Buyer's and NP's journey



In contrast to the platform-centric world and closed network marketplaces, where the focus is primarily on the buyer's journey, unbundled environments like ONDC recognize that both the buyer's and the network participant's journeys are equally crucial for the growth and health of the network. Therefore, it is essential to consider both journeys when identifying relevant

metrics for network observability to understand the performance of network participants and ecosystem participants.

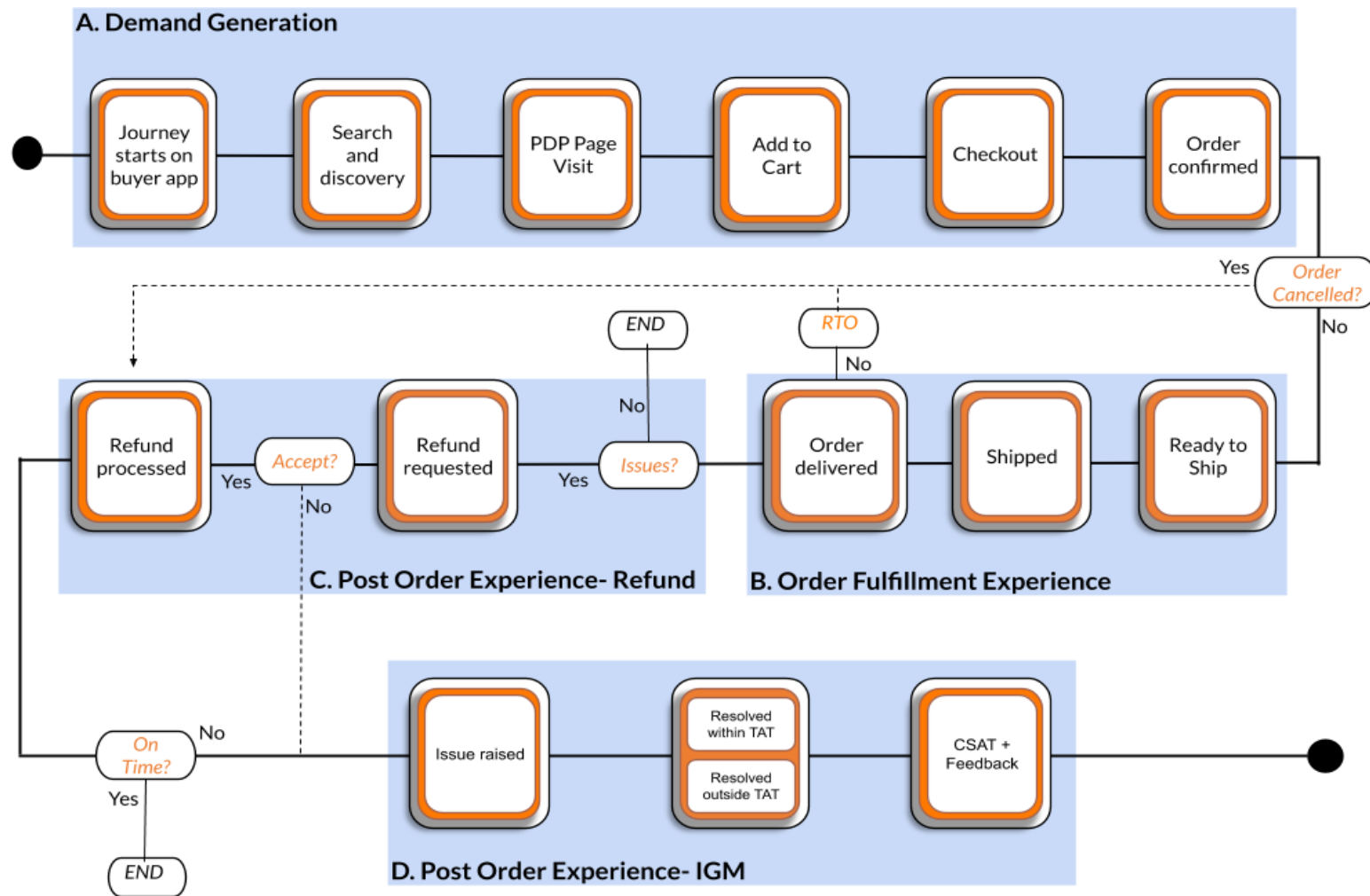
To improve the buyer experience, it is first necessary to comprehend the buyer journey and its associated metrics. A typical buyer journey consists of four main parts:

- Demand generation
- Order fulfilment experience
- Post-order fulfilment, including refunds
- Post-order experience when issues arise

Most successful transactions follow the first two parts, while the latter two come into play when complications occur. At each stage, there are multiple steps where the journey may encounter obstacles, particularly in an unbundled environment. A buyer's ability to complete a transaction and have a satisfactory experience depends on how efficiently each network participant facilitates the journey in a synchronized manner. For example, a drop in cart conversion may be influenced not only by the buyer's willingness to make a purchase but also by whether the seller app can provide relevant information to the buyer app without delays.

A buyer's journey on the network has been illustrated below:

Figure 5: Typical buyer journey on ONDC



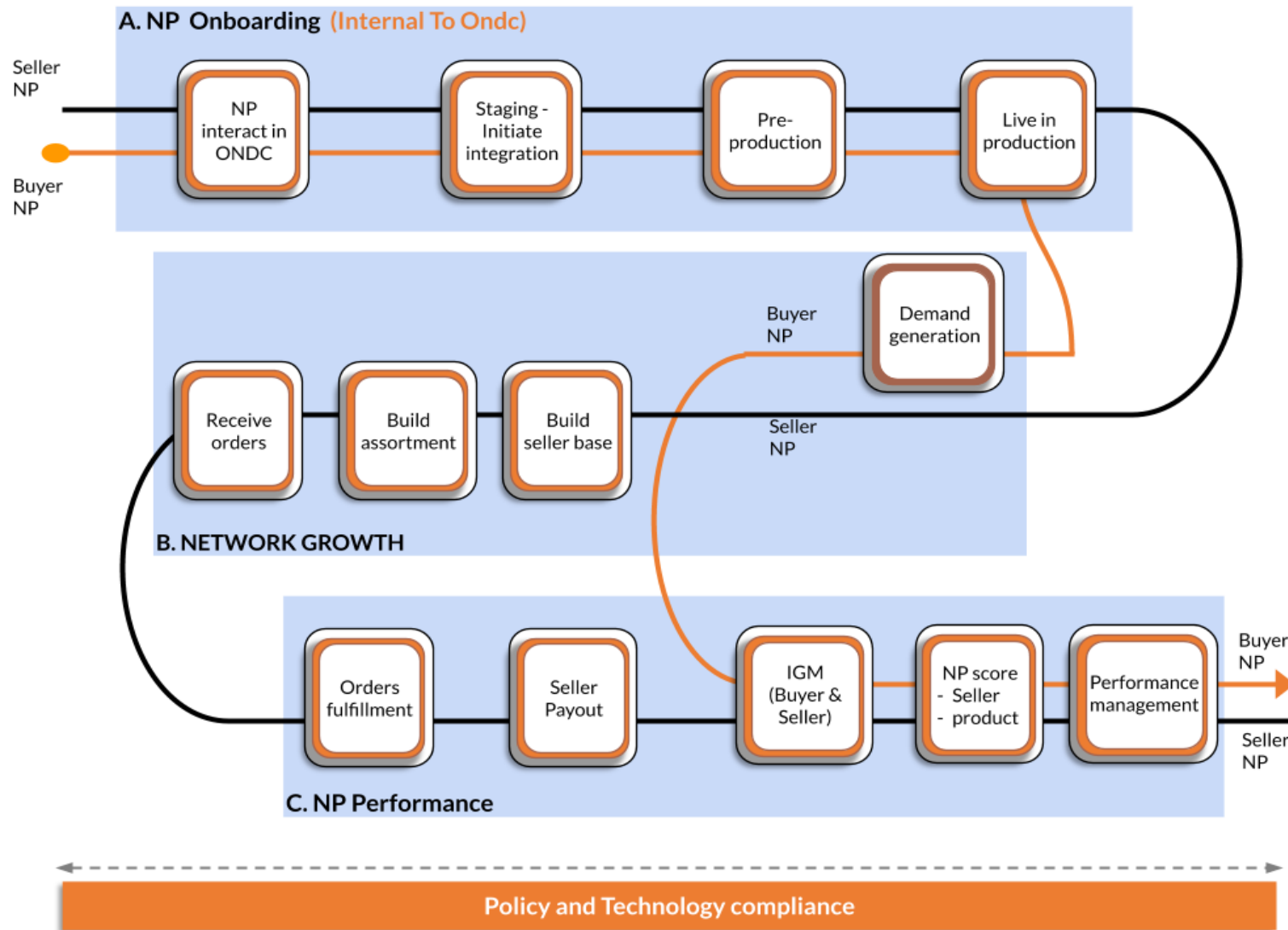
This is the part where the network participants' journey becomes equally important, how well they have set up their systems to speak the common prescribed language and how well they maintain their systems to ensure that the participants are truly interoperable. Network's growth, for example, is not only determined by the demand from the buyers but also from sellers since demand is driven by assortment that can address varied needs of the buyer. Assortment growth would be a function of ease of onboarding and ease of doing business for sellers, which is determined by how equitable and elastic the practices and protocols have been set up for the marketplace.

Once a participant joins the network, whether on the supply side or buyer side, their ability to deliver on the buyers' expectation across the four legs of the journey would determine the market forces.

Across all of this, ensuring the network remains healthy both technically and operationally will be something this framework would enable for any open networks, not just ONDC.

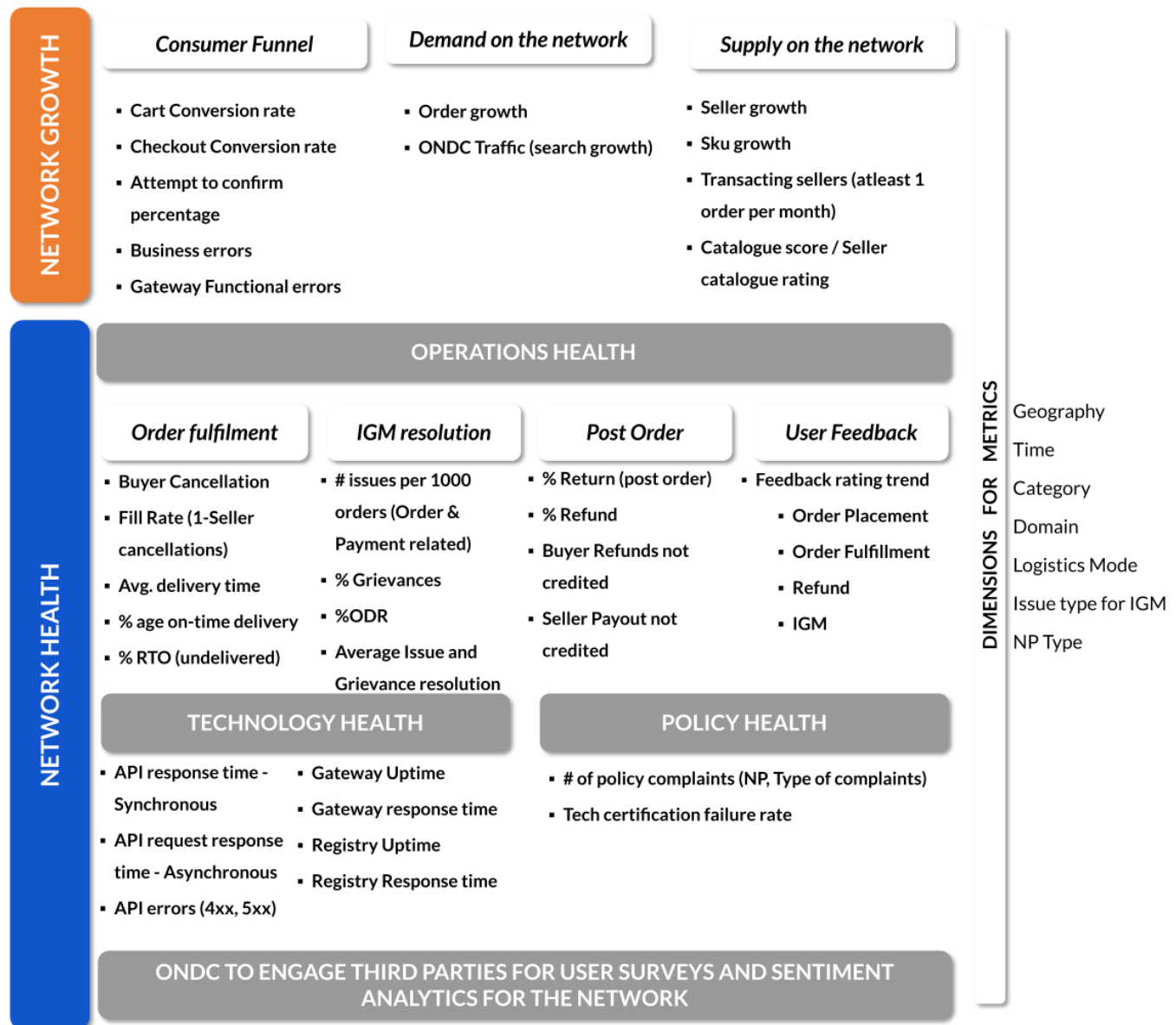
A typical network participant's journey on the network has been illustrated below:

Figure 6: Typical NP journey on ONDC



Based on the two journeys and the framework provided the dimensions which are most relevant for growth and health of network participants, a list of potential metrics for enabling network observability for ONDC are represented below:

Figure 7: Key Metrics



A subset of above metrics at aggregate level would help uncover actionable insights that could benefit all network participants. Observing these metrics specifically for their respective businesses would benefit network participants and empower them to implement self-monitoring capabilities in near real-time.

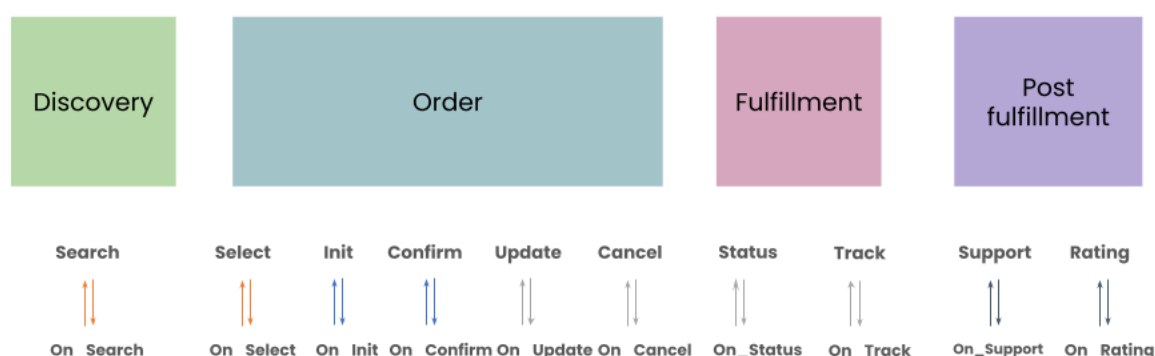
In order to standardise the approach and metrics across network participants, in the interim ONDC can potentially enable a network participant specific view for each participant however in the long term, the framework would serve as a tool to develop self-serve capabilities.

Network Observability Implementation

The implementation of Network Observability within the ONDC network aims to establish a reliable and comprehensive source of truth at the network level. In this setup, each participant operates and maintains their business independently while exchanging information via an open protocol. By achieving this, the network seeks to uncover network-level insights that enable individual participants to gauge their performance within the context of the entire network over time, thereby fostering stronger trust among all involved parties.

Like any online transaction, the consumer would move from discovery to order to fulfilment and post fulfilment stage; in the case of ONDC network, it would mean exchange of information between buyer app and seller app using specified APIs for each stage of the order journey. Following diagram illustrates this flow.

Figure 8: Discovery to Post fulfilment API flow



The participants in this scenario may include the seller app, buyer app, and logistics providers. They may need to interact through ONDC defined API contracts to fulfil the buyers' demands.

The Network Observability framework would help analyse the accuracy, promptness and frequency of information exchanged across the network, providing insights into both technical and business health. For example, the frequency of /on_select calls from the seller app helps assess network's promptness, since a healthy state should also mean all API calls are received in near real-time.

Understanding the trends at the aggregate level in terms of order fill rate, for example, can assist in recognizing high variances caused due to either business or technical errors, and early warning signals can help maintain a seamless buyer experience and build trust in the network. Similarly, observing API Response Time (Asynchronous Responses) can provide participants insights related to their infrastructure or business workflows for continued growth.

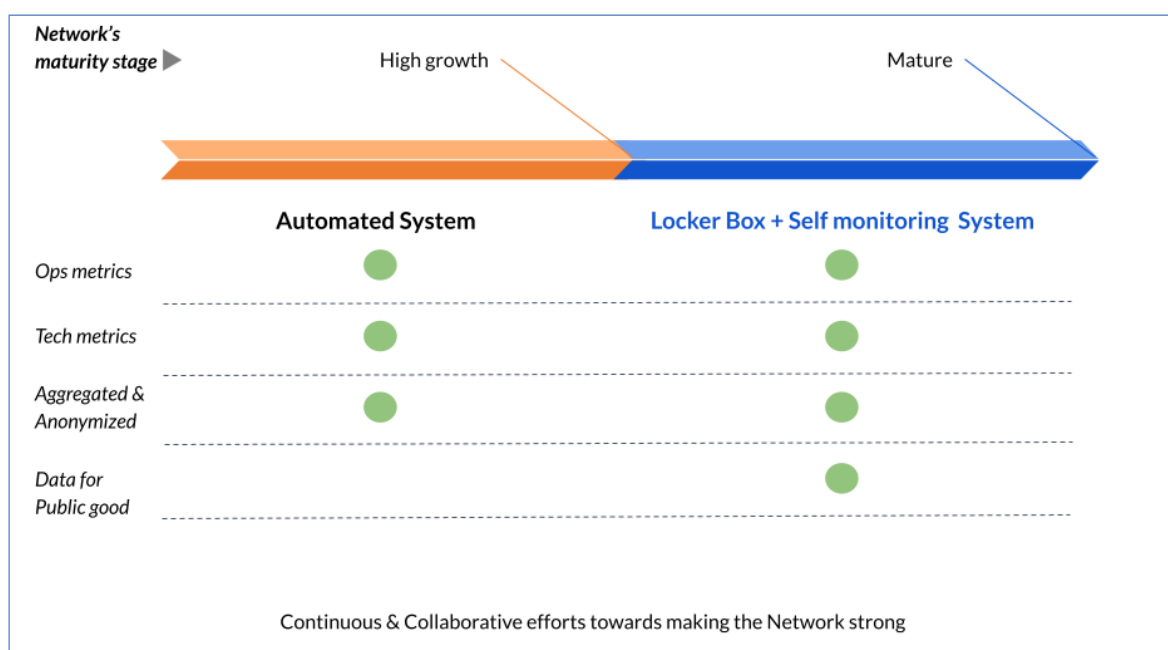
These examples clearly emphasise a fundamental requirement for the successful implementation of the network observability framework with the collective contribution of participants, enabling enhanced visibility into the information exchanged within the network.

Role of ONDC network in enabling Network Observability

The network functions as a facilitator, establishing a common utility and intelligence layer to assimilate information and publish them for participants to derive relevant insights. Leveraging network level insights and their business specific insights can help network participants learn about their specific business and technical performance, which can in turn help them drive growth more effectively. This would translate into improved health of the network.

However, implementing network observability in an open network is a complex journey. The ONDC network embarked on this journey from the beginning by defining processes and protocols to empower participants. In the current high growth stage, ONDC's role as a facilitator becomes even more critical to ensure healthy growth and a solid foundation for a mature state built on strong fundamentals.

Figure 9: Phases of network maturity



As the network witnesses an increasing number of participants, ensuring the network's health becomes paramount to facilitate this growth phase. To achieve this, the method of assimilating information and generating insights has been defined to be automated, near real-time, standardised, and scalable to handle the anticipated surge in transactions.

Interim Solution: Automated System

To address the needs of network observability in the high growth stage, participants need to align to the key design principles of this framework. Network participants would have to act as a cooperative to collectively provide complete visibility (while masking personal identifiable information and business sensitive information) to the information being exchanged on the

network across the consumer journey. The more near real-time the information is made visible, the more the network and its participants are set to gain from it.

To begin with, the network would leverage the insights via dashboards (similar to a control tower setup). The insights would be used to support network participants with specific actionable inputs. Intention is to ensure that participants at different levels of maturity on the network can get the right amount of support to continuously grow and become integral to the network ecosystem.

These insights would play a crucial role in sustaining and maturing the network during the high growth stage, particularly in an open and unbundled environment. For instance, when a network participant makes technical changes to their application, it can potentially affect the entire network's ability to interact with them. Such scenarios may arise during the nascent stage, which is why the implementation during the high growth stage focuses on identifying early signals and promptly notifying both the impacting and impacted participants in almost real-time.

Gradually, there will be more automation brought into the network observability approach and systemic alerts / reports could be shared with network participants.

1. The network participants would be able to get more visibility of the network's aggregate state and infer their own performance or identify new opportunities.
2. They will also be empowered to learn about their own performance from an external lens leveraging the standardised framework and in the form of participant specific score cards enabled, making it easier for them to self-observe, self-correct and continue to be interoperable.

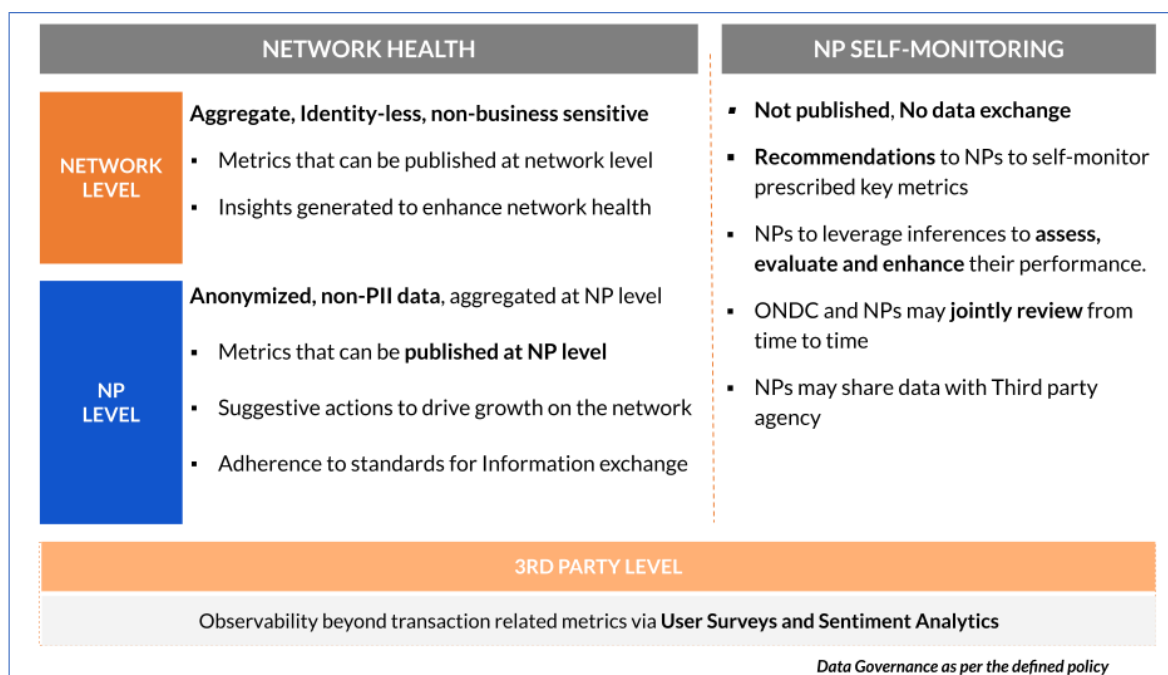
At no point, a network participant would have access to sensitive insights pertaining to another network participant. Data privacy and business sensitivity would be maintained to provide granular yet specific insights to respective network participants.

The network observability framework would go through its own journey to support the current state as well as the future state.

The Long-term solution: Locker Box + Self-monitoring System

To enable Network Observability in the mature stage, ONDC has envisaged that it would be enabled at Network, Network Participants, and external levels (3rd party view).

Figure 10: Approach for enabling Network Observability



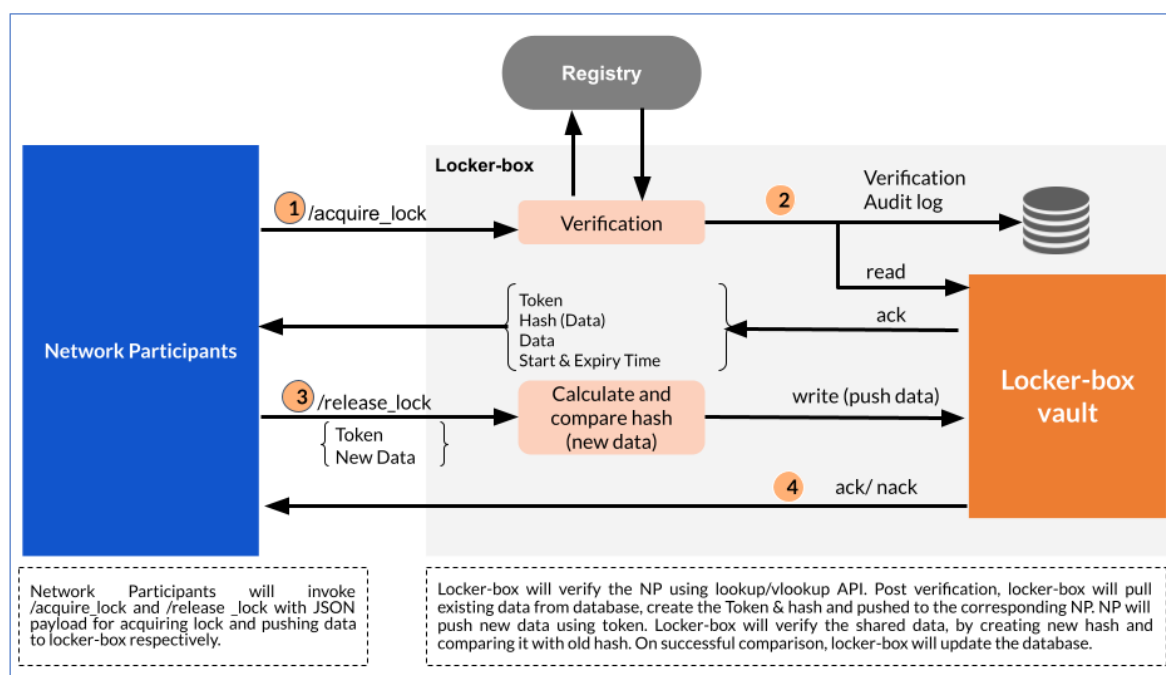
The metrics defined in the Network Observability framework would be published at Network level and to all network participants in aggregate, identity-less, non-business sensitive, anonymized and non-PII form. Network Participants can leverage self-monitoring options, make their own inferences to assess, evaluate and enhance their respective applications based on their business requirements.

Further facilitating the objectives of Network Observability, a long-term solution “Locker-box” has been envisaged. The solution, ensures complete adherence to observability design principles & policy and tech health observability at NP level, is pivot towards Network Observability Framework & NP Self-Monitoring.

Further, the model also ensures following, while sharing or receiving the data on the network:

- Anonymity while sharing non-PII and non-BII
- Secure and authentication mechanism while sharing details
- Leveraging established standardised formulas for metric calculations and insights generation

Figure 11: Concept of locker-box



Considering the limitations of data sharing to develop 'Locker-box', ONDC network has taken the following approach:

- Elements & specifications defined and communicated to the network participants. Detailed format released to participants enabling deletion of sensitive data as well as transaction data and seamless traversing to the network against pre-defined KPIs.
- The details to be shared by Seller apps and Buyer apps (retail, logistic, mobility etc) would be anonymized/masked and extracted by the respective Network Participants. The extracted data shall traverse to ONDC network through well-defined APIs
- To minimise the development effort at Network Participant's end, ONDC would develop utilities/APIs. NPs would have the following options to share the details on the network:
 - SDK and a self-governed APIs developed by ONDC to assist buyer APPs to collate and transfer data. NP will have an option for on-prem as well as cloud-based model,
 - NPs would also have an option to develop their own utility to share the data with the ONDC network in the required format.

Considering data security, the metrics would have two set of KPIs - one for public and another for internal monitoring and reference. As Network Observability is at the nascent stage, the data elements and format shall keep evolving as and when new use cases are enabled.

Usage and benefits of Network Observability

Network Observability from ONDC perspective

The Network Observability approach involves collecting and analyzing limited data from multiple Network Participants to assess the overall growth and health of the network. Participants contribute their data, which is aggregated to provide insights into the network's performance and progress. This aids in identifying trends, areas for improvement, and collaboration opportunities among participants.

The framework aims to establish benchmarks to measure growth and health, enabling participants to compare their metrics against these standards for performance evaluation and identifying areas for improvement. ONDC's design principles, including a minimalist approach, participative nature, and non-coerciveness, are derived from the network data to gain insights. The cooperative nature of the network fosters collaboration and innovation among participants.

To prioritize privacy and data protection, the network uses identity-less and non-sensitive data, anonymizing information through SDK or shared applications. This maintains confidentiality while allowing meaningful analysis and insights.

How Network Observability helps Network/Ecosystem Participants

Network or Ecosystem participants can gain valuable insights and understanding into the network's operations, health, and their own performance through Network Observability. This approach allows for the measurement of various metrics related to network performance, such as latency, throughput, error rates, and response times, offering visibility into the behaviour of applications, services, and infrastructure.

Network Participants can use these insights to identify bottlenecks, areas for improvement, and potential issues that may impact their operations. By analysing the collected data, they can take proactive measures to address performance bottlenecks, improve applications, and enhance overall system efficiency. Network Observability also enables participants to monitor usage patterns, identify peak loads, and plan for future scalability.

Furthermore, participants can compare their performance against established benchmarks, assess their progress, and strive for continuous improvement. The visibility into derived inferences from the data enables informed decision-making based on patterns, correlations, and trends.

In summary, Network Observability empowers participants to evaluate and enhance their network performance through actionable insights, benchmark analysis, and informed decision-

making. It facilitates optimization, resource management, and continuous improvement in network operations and technology.

In the interim approach where the automated system will be enabled, Network participants will start receiving insights as part of their monthly scorecard to begin with and gradually be provided access to self-service tools which they can login to view NP specific operational and technical metrics. It would significantly reduce the analytics and insights generation effort for each of the network participants and provide a template for new network participants to understand what metrics to look at in the context of digital commerce. They will also gain access to an aggregate, anonymized network level view of the high-level metrics like order growth, attempt to confirm rate, fill rate, cancellation rate, etc.

As the network matures, and the long-term approach of the locker-box model is deployed, business and operational insights provided by ONDC for network participants would become more aggregate and anonymized except for tech metrics. The assumption is that NPs would have by then scaled to develop their self-monitoring mechanisms from an operational standpoint and would require only specific insights centrally to ensure effective interoperability.

Applicability across Sectors

The network observability framework presented in this paper has wide applicability across various sectors and industries, covering aspects such as telemetry, data analytics, and operations. It can be implemented in both single-entity and multi-party ecosystems. Technology-driven operations and seamless user experiences are crucial for the growth and success of any entity, making the adoption of this framework imperative.

In the public sector, observability is vital for initiatives with a population-scale impact. For example, it can help monitor and improve healthcare facilities nationwide, detect operational issues, and ensure compliance. The transport sector can leverage observability to optimize fleet management, monitor vehicle performance, and enhance logistics planning for timely deliveries. Large enterprises benefit from network observability by identifying and resolving technical glitches promptly, avoiding major disruptions. The agriculture sector can utilize observability to monitor IoT devices, collect data for informed decision-making, and optimize yield.

In the entertainment industry, network observability is crucial for over-the-top (OTT) platforms to ensure uninterrupted content delivery, improve user experiences, and personalize content recommendations. By applying the framework, these platforms can monitor performance metrics, detect issues, and optimize their streaming services.

Overall, the network observability framework provides valuable insights and monitoring capabilities across sectors, enabling organizations to enhance their operations, optimize user experiences, and mitigate risks effectively.

Data Governance

In the context of Network Observability, the guiding principles for data governance will be:

- **Data minimization:** Collecting the minimum data necessary to provide an independent view of network growth and health.
- **Privacy by Design:** All data collection for network observability will ensure that data privacy is implemented by design and to the extent feasible, anonymized or pseudonymized data shall be used for computing and reporting network growth and health metrics.
- **Principle of least privilege:** Even though the majority of the data for network observability is expected to have non-identifiable data, in exceptional scenarios where ONDC or NP has access to any data for computational purposes, the principle of least privilege shall be adopted.
- **Data as a shared asset:** The data submitted by NPs to enable network observability shall be treated as a shared asset of all NPs of the ONDC network and no single entity will have rights or privileges over the NO data.

In line with the above principles, the ONDC network observability framework will ensure that minimal, non-identifiable data is utilised to compute and report network health and growth metrics and each stakeholder has the least or minimal set of privileges required to access or view the data.

In ONDC context, Data governance is a discipline focused on quality control that involves assessing, managing, using, monitoring, maintaining, and protecting organisational information. It establishes a framework of decision rights and accountabilities for information-related processes. This is based on agreed-upon modality between Network participants and ONDC network that define the permissions and actions participants can take with specific information, as well as the conditions, methods, and timing under which these actions are allowed. In essence, data governance provides guidelines and structures to ensure effective and responsible management of data within an organisation.

During the transition data analysis takes place, ensuring data quality becomes a crucial factor. It is imperative to consider implementing a data policy to effectively control and maintain data quality across the Network. This implementation can significantly enhance the value derived from the data governance initiative. Here are some key considerations to determine usage of data under Network Observability:

- **The right strategy:** defining the vision and scope of the data governance program, derived from a thorough understanding of the current state of data management.
- **Communication:** Outlining the objectives and ensuring it is shared with all the participants to create awareness and alignment.
- **Data quality:** Emphasise ensuring data quality at the source, as it directly impacts downstream systems that consume the data. By maintaining high-quality data at its origin, the integrity and reliability of subsequent processes and analyses are preserved.

While establishing data governance, ONDC has considered various parameters like anonymized personally identifiable information (PII), aggregate, identity-less, non-business sensitive data and confidentiality, to ensure the protection and responsible handling of data.

Further, below data governance components have been identified in the network policy:

- Receiving
- Storing
- Backup
- Purging
- Archiving Sharing

Please refer to [ONDC Network policy](#) for more details.