

# P2P 네트워크에서 DLT 기반 서비스를 위한 고속 메시지 전달

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## Fast Message Delivery for DLT-based Services in P2P Networks

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### Abstract

Distributed ledger technology (DLT) is typically managed by a peer-to-peer (P2P) network where nodes collectively adhere to a protocol to communicate and validate new events. There are some drawbacks concerning the P2P network, e.g., lack of direct message exchange functions between P2P nodes, making it difficult to apply a distributed consensus technology through minimal message exchange. Besides, existing broadcast-based P2P protocols have limitations and problems in configuring a large-scale consensus network. When configuring a P2P network based on an optimal path, a route node such as a hub node becomes vulnerable to distributed denial-of-service attacks. In addition, finding an optimal path for fast message transfer is a big challenge, especially in a large-scale network. In this paper, we propose a possible way to support fast message delivery for DLT-based services in P2P networks.

### I. Introduction

The ability to quickly disseminate new events from ordering nodes to all peers is critical for ensuring both performance and consistency in P2P networks. The typical implementation of the DLT services via P2P in Fabric may lead to high event propagation latencies, which may impact performance, consistency, and fairness. A new design is needed for optimizing the propagation time, tail latency, and bandwidth consumption. This paper proposes a possible way to support fast message delivery for DLT-based services in P2P networks.

### II. Fast Message Delivery for DLT Services

The existing DLT services in P2P networks could be enhanced by defining a new framework for fast message delivery. The P2P network can be composed of different types of networks, e.g., tree-based networks and mesh-based networks. DLT [1] can be used to ensure secure event management among nodes, and the P2P network can be used for event transfer among trustable nodes by using overlay networks. In this situation, it is critical to find the optimal path between peers to exchange messages for DLT-based services in a fast manner. To achieve the goal, this paper addresses several issues such as real-time network monitoring and optimal path selection based on the multigraph shortest path mechanism. The monitored information can be used as input for a multigraph DLT network.

Figure 1 shows a framework to support fast message delivery for DLT-based services, which comprises various functional entities including a DLT platform, a network monitoring and management module, an event transmission module and management, and a consensus management module. The network monitoring and management module monitors the network in real-time and maintains a table to find the optimal path between the source and destination nodes. The DLT platform provides various DLT functions to all the network nodes to participate in DLT-related activities. The event transmission module manages event transmission and reception, and the consensus management module is responsible for consensus method selection, consensus message transmission and reception, and session management for DLT-based services.

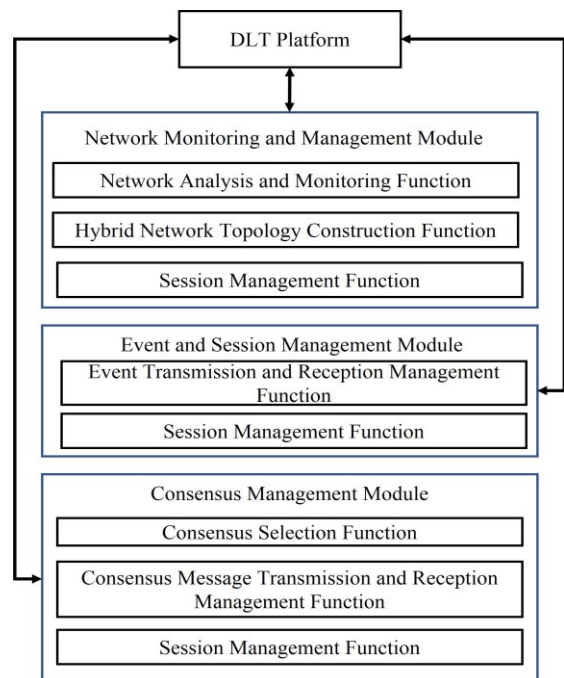


Figure 1: Fast message delivery for DLT-based services

### III. Concluding Remark

In this paper, we proposed how to support fast message delivery for DLT-based services. Specifically, it includes the network monitoring and management module, the event and session management module, and the consensus management module.

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### References

- [1] "Focus Group on Application of Distributed Ledger Technology," ITU, <https://www.itu.int:443/en/ITU-1339/focusgroups/dlt/Pages/default.aspx> (accessed Jan. 11, 2023).