Insights on Next Generation WLAN: High Experiences (HEX)

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Abstract: Wireless local area networks (WLANs) have witnessed rapid growth in the past 20 years, with maximum throughput as the key technical objective. However, quality of experience (QoE) remains the primary concern for wireless network users. We point out that poor QoE is the most challenging issue in current WLANs and further analyze the key technical problems that cause poor QoE in WLANs, including fully distributed networking architectures, chaotic random access, awkward "high capability" issues, coarse-grained quality of service (QoS) architectures, ubiquitous and complicated interference, "no place" for AI issues, and heavy burden of standard evolution. To the best of our knowledge, this is the first work to point out that poor QoE is the most challenging problem in current WLANs, and the first to systematically analyze the technical problems that cause poor QoE in WLANs. We strongly suggest that achieving high experience (HEX) be the key objective of the next-generation WLANs.

Keywords: wireless local area network; IEEE 802.11; quality of experiences; Wi-Fi; 802.11bn; ultra-high reliability

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1 Introduction

Wireless networks are an indispensable and fast-growing technology in human lives. After more than 20 years of development, wireless local area networks (WLANs) and cellular networks have become dominant types of wireless networks. WLANs are standardized by IEEE 802.11, and IEEE 802.11be[1–3] is the latest commercially available WLAN standard. IEEE 802.11be, also known as Extremely High Throughput (EHT) or Wi-Fi 7, was officially released in 2025[4]. Now, both industry and academia are focusing on the key technology research and standardization of IEEE 802.11bn, which is the next generation of IEEE 802.11be. IEEE 802.11bn, also called Ultra-High Reliability (UHR) or Wi-Fi 8, is expected to be officially published in 2028 or 2029[5–11]. In 2025, Draft 1.0 of IEEE 802.11bn was released. It introduces several notable features, including seamless roaming, non-primary channel access, coordination of multiple access points (APs), in-device coexistence, dynamic power save, etc. It can be seen that WLAN technology and its standardization process are developing very rapidly.

IEEE 802.11 has undergone eight major versions, including IEEE 802.11a, b, g, n, ac, ax, be, and bn. Among these, only IEEE 802.11ax and bn take high efficiency as the technical objective, while other WLAN standards take maximum throughput as their key technical objective. Throughput is quite important, because higher throughput means WLANs can provide more capacity for the wireless traffic. However, with the increasing diversity of wireless services, such as virtual reality (VR), meta universe, ultra-high resolution online video, real-time games, remote medical services, and industry applications, it is increasingly difficult for WLANs to guarantee the quality of service (QoS) for these diverse services. More importantly, quality of experience (QoE) is the most important concern of wireless network users. QoE is not only related to the QoS, but also to other factors like human subjective perceptions. This makes QoE an important and urgent consideration for wireless networks.

Poor QoE is the most challenging problem in current WLANs. For instance, in many parts of China, as long as the traffic data fee for cellular networks is within budget, people would rather choose 4G/5G than free Wi-Fi. The problem lies not in peak performance, but in performance stability: Wi-Fi performance changes dramatically over time. In practice, the claimed "very/extremely high throughput" can hardly be experienced. Therefore, we believe high QoE should be the key objective of the next generation WLAN standard. The problem becomes serious in the fiber-to-the-room (FTTR) scenario, since potential interference sources are complex, e.g., neighboring networks, multiple intra-home cells and different kinds of devices. Table 1 shows some comparisons between WLANs and cellular networks. In this paper, we analyze the key technical problems that lead to poor QoE of WLANs. This is the first work to identify poor QoE as the most challenging problem in current WLANs, and the first to systematically analyze the technical factors behind it.

2 Overview of Key Technical Problems

Based on our analysis, there are seven key technical problems that lead to poor QoE of WLANs. They are summarized as follows:

• Network architecture: Different from cellular networks, WLANs adopt a fully distributed network architecture. This architecture has its advantages, but it usually leads to a disordered network status, resulting in low QoE.

• Channel access: Stations (STAs) and APs randomly contend for the channel, resulting in chaotic channel access among STAs.

• Transmission: IEEE 802.11be includes new features, such as multiple link operation (MLO), larger bandwidth (e.g., 320 MHz), higher-order modulation (e.g., 4096-QAM), 1024-frame aggregation, more spatial streams (16 SS), etc. These potential features sound attractive. However, the actual available performance is far from its stated high capability.

• QoS guarantee: The current QoS architecture is traffic class based. Eight traffic identifiers (TIDs) and four access categories (ACs) cannot keep pace with the increasingly diverse services.

• Interference management: Unlike that in cellular networks, random interference from the overlapping basic service set (OBSS), intra-BSS, and non-Wi-Fi systems is ubiquitous and complex.

• Network intelligence: Making networks more intelligent is a natural and promising target, but there appears to be no place for AI in the standardization process.

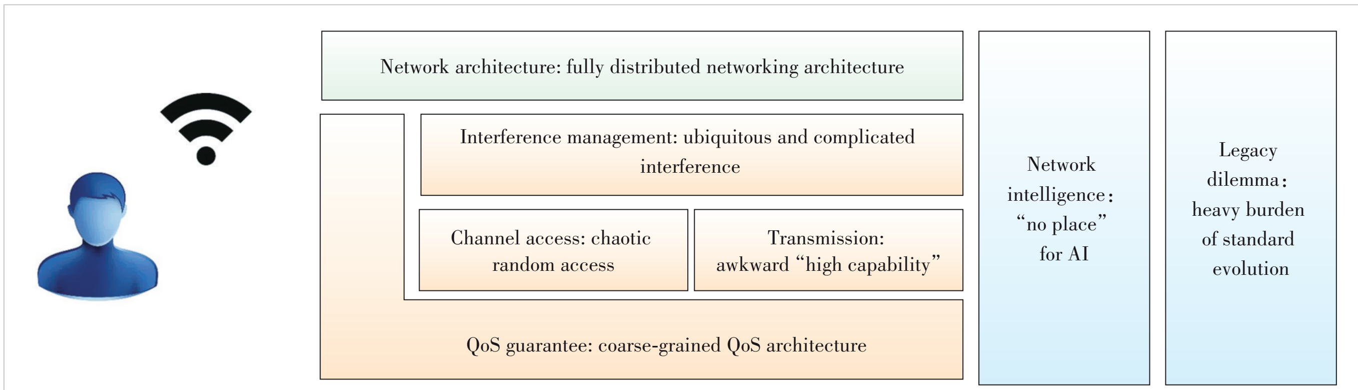
• Legacy dilemma: Essentially, with each evolution of the IEEE 802.11 standard, the newly revised version has no choice but to coexist with many versions of legacy STAs.

As shown in Fig. 1, network architecture problem is the framework-related challenge derived from topology, deployment and composition. Channel access and transmission prob-

Table 1. Comparisons between WLANs and cellular networks

Feature	WLAN	Cellular Network
Network deployment	Advantages: easy, open, and flexible to deploy Disadvantages: interference is difficult to control	Advantages: interference is controllable Disadvantages: in need of careful design and test; inflexible that only allows the mobile operators to deploy
Channel access and transmission	Advantages: easy to access the channel for each device with less control and management signaling Disadvantages: strong interference and collisions and low resource utilization ratio	Advantages: collision-free; little interference and high resource utilization ratio Disadvantages: all uplink and downlink channel access and transmission need to be scheduled by the base station with heavy control and management signaling
QoS and QoE	Advantages: in light traffic load scenarios, the access latency is low because of random access strategy Disadvantages: in medium or heavy traffic load scenarios, the QoS and QoE are quite poor and uncertain	Advantages: high certainty Disadvantages: high access latency because of heavy signaling in light traffic load scenario

QoS: quality of service QoE: quality of experience WLAN: wireless local area network



QoS: quality of service

Figure 1. Architecture of the key technical problems that cause poor QoE of WLANs

lems are summarized from the perspective of a single BSS or any BSS, while the interference management problem is analyzed from the perspective of multiple BSSs or the OBSS. Furthermore, the QoS guarantee problem is obtained by analyzing the problems existing in the QoS guarantee methods at all levels, including channel access, transmission, and interference management. Moreover, network intelligence and legacy dilemma problems are two relatively independent aspects that have a significant impact on WLAN performance and standardization. In the following section, we analyze these technical problems in detail.

3 Analysis of Factors Influencing Key Technical Problems

3.1 Fully Distributed Networking Architecture

Different from cellular networks, WLANs adopt a fully distributed network architecture, in which there is no central controller to regulate or manage the behaviors of multiple BSSs. Even in a single BSS, the control and management functions of the AP are limited. Typically, APs and STAs independently make their own decisions without coordination. A distributed architecture has its advantages, such as flexibility and easy deployment, but it usually leads to a network disorder. Consequently, the fully distributed architecture makes the network inefficient, resulting in low QoE.

For example, within a single BSS, the network is distributed even in the presence of an AP. Both the AP and STAs randomly contend for channel access. The STAs can determine their own configurations and parameters for channel access, transmission, etc. Furthermore, coordination within an extended service set is still very limited. We highlight that network architecture is of greater significance for FTTR scenarios, as FTTR involves more flexible yet complex in-home network topologies. Even in deployed enterprise networks, distributed features also result in many problems, such as the starvation problem (flow-in-the-middle), which makes it quite difficult for some BSSs or STAs to access the channel.

The influencing factors of the fully distributed networking architecture are summarized as follows.

• It lacks overall and top-level architecture design. Since the inception of IEEE 802.11, WLANs have always followed the distributed networking architecture to facilitate deployment. With the standard versions evolving from generation to generation, this distributed architecture is more deeply rooted and difficult to change.

• The distributed architecture is the basis of network management, control, and data transmission. This means that all aspects of network functions are designed and developed based on it, making the whole system affected by this architecture.

• The current industrial, scientific, and medical (ISM) bands are limited and the environment is complex. WLANs operate on the ISM bands, especially the 2.4 GHz, 5 GHz, and 6 GHz bands. The ISM band's frequency bandwidth is limited, which leads to insufficient resources for WLAN architecture changes. Moreover, many wireless network types work on the ISM bands, such as Wi-Fi, Bluetooth, Zigbee, and microwave ovens. Thus, the channel environment is quite complicated, which increases the technical and policy difficulties for WLANs to change the distributed architecture.

3.2 Chaotic Random Access

In the media access control (MAC) layer, STAs and APs randomly contend for the channel according to the enhanced distribution channel access (EDCA) scheme based on the carrier sense multiple access with collision avoidance (CSMA/CA) mechanism, resulting in chaotic channel access among STAs. Chaotic random access significantly exacerbates collisions, ineffective access, and transmission issues, which lead to low QoE.

For example, STAs randomly access channels by consistently using the maximum TX power, setting a transmission opportunity (TXOP) limit exceeding the actual demand. For home and enterprise scenarios including FTTR, multiple BSSs or multiple STAs within a single BSS often act as "enemies" to one another. Moreover, IEEE 802.11be introduces restricted target wakeup time (r-TWT) to improve latency performance, but the rule "non-AP EHT STAs may behave as if overlapping quiet intervals do not exist" exacerbates random collisions.

The factors influencing chaotic random access are summarized as follows.

• Deep-rooted random channel access: In the first version of IEEE 802.11, CSMA/CA mechanism was adopted. Although the channel access mechanism has been improved during the WLAN standard evolution, such as the transition from distributed channel function (DCF) to EDCA, the CSMA/CA mechanism based on the idea of random access is still deep-rooted.

• Rigid clear channel assessment (CCA) and energy detection (ED) thresholds incompatible with diverse scenarios: In order to support CSMA/CA, IEEE 802.11 adopts the ED threshold and the CCA threshold to determine channel status. However, the rigid CCA and ED thresholds do not dynamically change as the environmental status varies.

• Lack of a well-designed channel access structure: Well-designed channel access mechanisms, such as scheduled channel access and reservation-based channel access, have several performance advantages. These mechanisms can be important supplements to random channel access and further form a more complete channel access structure.

• Inappropriate channel access rules for new bands: Originally, a clean 6 GHz band was available for Wi-Fi, but we adopted the CSMA/CA mechanism directly and contaminated this frequency band. If there are new bands for WLANs in the future, we can fully seize the opportunity to carry out new designs.

3.3 Awkward "High Capability"

Several new features for IEEE 802.11be have been mentioned in Section 2. While these potential features appear promising in theory, their actual performance falls far short of the claimed capabilities. A series of valuable technologies cannot be implemented in practice, and thus, high-quality user experiences are also unattainable.

For example, in high-density deployment scenarios, complex interference among multiple BSSs and STAs makes it nearly impossible to achieve 320 MHz bandwidth; instead, 20 MHz or 40 MHz is normal. Furthermore, 4 096-QAM or even 1 024-QAM is difficult to use because of the demanding signal-to-interference and noise ratio (SINR) threshold. Notably, 5G only uses 256-QAM as the highest modulation order. Increasing the number of spatial streams is also challenging because of inter-stream interference and complex user grouping.

The influencing factors behind the awkward "high capability" are summarized as follows.

• Complicated channel environment and interference: The WLAN operates at the ISM band, resulting in more cross-system interference. The fully distributed architecture and the chaos random access significantly increase the inter-BSS and inter-STA interference. In this case, the channel environment and interference become quite complicated, making the conditions of the potential high performance enabling technologies hard to meet.

• Lack of mechanisms to realize these valuable technologies in practice. There are few mechanisms to guarantee that the conditions required by the potential high-performance enabling technologies can be met. This makes these technologies remain high-performance only in theory rather than in real-world applications.

• Declining efficiency: The higher the peak throughput, the lower the efficiency. The primary reason is that higher peak throughput leads to relatively larger protocol overhead. The transmission duration of the control frames, channel access time, and the inter-frame space do not decrease with the data transmission rate. Moreover, some rules restrict each other; for example, the maximum physical layer protocol data unit (PPDU) length restricts the aggregation size.

3.4 Coarse-Grained QoS Architecture

The current QoS architecture is traffic class-based. Traffic received from upper layers is mapped to eight TIDs and four ACs. But traffic (or service) types are getting increasingly diverse. Thus, the current class-based QoS mechanism cannot keep pace with the increasingly diverse services. QoS is the premise of QoE, and poor QoS will inevitably lead to poor QoE.

For example, increasingly diverse services (such as VR, real-time cloud games, the metaverse, digital twins, and remote healthcare) require highly diverse and challenging QoS. Furthermore, it seems we have to achieve the "unattainable" low-latency objective. Although low latency is a feature of IEEE 802.11be, there are few effective solutions in IEEE 802.11be except r-TWT. Several standard proposals discuss a latency guarantee of less than 1 ms, which seems "unsolvable" for Wi-Fi. Moreover, complicated environments lead to unstable resource acquisition, further resulting in inconsistent performance.

Some new scenarios like FTTR and Internet of Things (IoT) are considered important application scenarios. Various types of applications coexist in FTTR scenarios, such as videos, screen casting, and VR. The QoS and QoE requirements of these applications are quite different. However, WLANs only pursue increasingly larger bandwidth and other enablers, making them "unfriendly" to FTTR and IoT.

Mobility support is increasingly important for WLANs. However, seamless Wi-Fi roaming is challenging for the current standards.

The influencing factors of the coarse-grained QoS architecture are summarized as follows.

• Need for QoS architecture with appropriate granularity: The current class-based QoS mechanism (especially its eight TIDs and four ACs) cannot meet the requirements of the increasingly diverse services. Thus, other QoS mechanisms (e.g., packet-level or finer granularity) should be fully studied. It is worth noting that we propose a particle access method and theory for wireless networks by treating each packet with several attributes as an "information particle"[12]. After optimally combining some information particles into an information particle group, a low-complexity scheduling strategy is used to deploy packet-level resource allocation and provide the packet-level QoS guarantee, ensuring the latency and the throughput requirements of the "particle" are met.

• Fine scalability: The QoS mechanism should keep pace with the continuous evolution of wireless services. Thus, better scalability is quite important.

• Lack of truly effective solutions for low latency/jitter: WLANs face great challenges in ensuring low latency. If low latency/jitter cannot be guaranteed, the future of WLANs will be bleak.

• Stable resource acquisition: Only with stable access to resources can QoS and QoE be improved. However, there is a lack of mechanisms for resource acquisition.

• Integrated wide-band systems and narrow-band IoT: IoT usually requires a small bandwidth (narrow band) in many scenarios because of energy consumption and cost. But large bandwidth has always been the technical goal of WLANs. For the future, if wide band and narrow band systems cannot be integrated in the WLAN standard, the WLAN will probably not keep up with the development tide of the IoT.

• Seamless Wi-Fi roaming: As the operating frequency becomes higher, the BSS becomes smaller and denser. Thus the mobility of nodes has to be considered. If QoS cannot be guaranteed during the node movement, QoE will be seriously affected. The challenge lies in the fact that, unlike cellular networks, WLAN did not take supporting mobility as an important goal at the beginning.

3.5 Ubiquitous and Complicated Interference

Quite different from cellular networks, random interferences from OBSS, intra-BSS, and non-Wi-Fi systems are ubiquitous and complicated. Interference leads to poor network performance, which in turn results in poor QoE.

For example, high-density deployment scenarios will be typical in future wireless networks. WLAN devices made by different vendors adopt different implementations to select channels, bandwidth, access parameters, etc., which makes interference among BSSs extremely complicated. IEEE 802.11ax introduces spatial reuse (SR), which further increases interference among BSSs. Moreover, cross-system interferences may come from various non-Wi-Fi systems such as licensed assisted access (LAA), LTE-u, Sparklink (Nearlink), etc.

The influencing factors of the ubiquitous and complicated interference are summarized as follows.

• Lack of inter-BSS coordination: As deployment scenarios become increasingly dense, ubiquitous and complicated interference emerges. However, the inter-BSS coordination is very limited in current WLANs.

• Complicated ISM band interference. WLANs operate on the ISM band. Many heterogeneous systems, such as Bluetooth, LAA, LTE-u, Zigbee, work on the same band. More importantly, devices cannot understand frames sent from different systems, making cross-system interference ubiquitous.

• Lack of explicit technical rules for WLAN coexistence with other systems. For the coexistence of the heterogeneous systems, there is a lack of explicit technical rules, such as channel access rules among different systems, which aggravates interference complexity.

• Shortage of new bands for WLANs. New bands can mitigate interference, but spectrum resources are limited.

3.6 "No Place" for AI

User experience is subjective and complex. Making networks more intelligent is a natural and promising target for WLANs, but it seems there is "no place" for AI in standardization. Network intelligence can help us evaluate complex user experience and choose the optimal method to guarantee QoE. Many studies on supervised learning and reinforcement learning without deep learning have been proposed in recent years, but they lack support from standards, making AI solutions difficult to extend.

For example, several standard proposals discuss the importance of AI for WLANs. However, machine learning is usually considered an internal tool for each individual module in a single device. Such a kind of AI obtains limited performance gains and poor scalability. Moreover, there are lots of AI models, training methods, and algorithms. Simply standardizing a specific one is not scalable.

To better embrace AI, we need to answer the following questions: What can AI do for WLANs? What can standardization do for AI? What is the AI standardization architecture in IEEE 802.11? At least, network AI does not simply mean implementing specific AI models or algorithms.

3.7 Heavy Burden of Standard Evolution

Different from cellular networks, every time the IEEE 802.11 standard evolves, it has no choice but to coexist with many versions of legacy STAs, which is a heavy burden for standard evolution. Dropping the heavy burden of legacy is beneficial to the technical innovation, as it allows us to focus on and further guarantee the user experience enhancement of the new-generation standard.

For cellular networks, standard evolution is unfettered, featuring new bands, new designs, new frame formats, etc. However, for WLANs, standard evolution has to keep good backward compatibility, which is a "double-edged sword". For example, a clean 6 GHz band was available for Wi-Fi, yet we simply incorporated all the old technologies. Moreover, the frame format is continuously patched. As the standard evolves, these patches have become fragmented.

The influencing factors of the heavy burden of standard evolution are summarized as follows.

• Old and new versions share the same bands. This makes it difficult for new-generation standards to break free from coexistence constraints and carry out new designs.

• Devices, especially APs installed with new standards, have to serve all old versions. This makes it impossible for the new standards to break away from compatibility limitations and carry out new designs.

• Frame formats are full of patches, but little emphasis is placed on scalable designs or clean-sheet designs.

4 Conclusions

In this article, we point out that poor QoE is the trickiest problem affecting the evolution and user growth of WLANs. More importantly, we analyze in detail seven technical problems that cause poor QoE of WLANs. To the best of our knowledge, this is the first work to point out that poor QoE is the most challenging problem for current WLANs, and also the first to systematically analyze the technical problems that lead to poor QoE of WLANs. Table 2 summarizes the key technical problems and further analyzes the threat types and the importance of each problem.

The vision of wireless networks is, in our opinion, to enable people to enjoy wireless connectivity and to enhance ubiquitous interconnection. We are glad that WLANs have achieved and continue to achieve great success. It is time for us to carefully think about things from the users' perspective. Therefore, to achieve high quality experiences is highly suggested as the key objective of the next-generation WLAN: Wi-Fi 9.

Table 2. Summary of the key technical problems that lead to poor quality of experience of WLANs

Feature	Problem	Threat	Importance
Network architecture	Fully-distributed networking architecture	Disorder	★★★★★
Channel access	Chaotic random access	Disorder	★★★★★
Transmission	Awkward "high capability"	Low efficiency	★★★★
QoS guarantee	Coarse-grained QoS architecture	Weak adaptability	★★★★
Interference management	Ubiquitous and complicated interference	Disorder	★★★★
Network intelligence	"No place" for AI	Weak adaptability	★★★
Legacy dilemma	Heavy burden of standard evolution	Hindering evolution	★★★

QoS: quality of service

References

[1] YANG M, LI B. Survey and perspective on extremely high throughput (EHT) WLAN: IEEE 802.11be [J]. Mobile networks and applications, 2020, 25(5): 1765 – 1780. DOI: 10.1007/s11036-020-01567-7

[2] Cisco. Visual networking index: white paper [R]. San Jose, USA: Cisco, 2020

[3] DENG C L, FANG X M, HAN X, et al. IEEE 802.11be Wi-Fi 7: new challenges and opportunities [J]. IEEE communications surveys & tutorials, 2020, 22(4): 2136 – 2166. DOI: 10.1109/COMST.2020.3012715

[4] LAN/MAN Standards Committee of IEEE Computer Society. IEEE standard for information technology-telecommunications and information exchange between systems local and metropolitan area networks specific requirements. Part 11: wireless LAN medium access control (MAC) and physical layer (PHY) specifications. Amendment 2: enhancements for extremely high throughput (EHT): IEEE Std 802.11be-2024 [S]. 2025

[5] GALATI-GIORDANO L, GERACI G, CARRASCOSA M, et al. What will Wi-Fi 8 be? A primer on IEEE 802.11bn ultra high reliability [J]. IEEE communications magazine, 2024, 62(8): 126 – 132. DOI: 10.1109/MCOM.001.2300728

[6] WEI D Y, CAO L, ZHANG L, et al. Optimized non-primary channel access design in IEEE 802.11bn [C]//IEEE Global Communications Conference. IEEE, 2024: 4588 – 4593. DOI: 10.1109/GLOBECOM52923.2024.10901367

[7] WILHELMI F, GALATI-GIORDANO L, GERACI G, et al. Throughput analysis of IEEE 802.11bn coordinated spatial reuse [C]//IEEE Conference on Standards for Communications and Networking (CSCN). IEEE, 2023: 401 – 407. DOI: 10.1109/CSCN60443.2023.10453190

[8] MECKLENBURG B, ANSARI A H, RICHERZHAGEN B, et al. Seamless roaming based on distributed multi-link operation over IEEE 802.11bn [C]// International Conference on Factory Communication Systems (WFCS). IEEE, 2025: 1 – 8. DOI: 10.1109/WFCS63373.2025.11077616

[9] NUNEZ D, WILHELMI F, GALATI-GIORDANO L, et al. Spatial reuse in IEEE 802.11bn coordinated multi-AP WLANs: a throughput analysis [C]// IEEE Conference on Standards for Communications and Networking (CSCN). IEEE, 2024: 265 – 270. DOI: 10.1109/CSCN63874.2024.10849731

[10] YAN R, GUO Z Y, LIU P, et al. Multi-agent reinforcement learning-based channel access optimization for IEEE 802.11bn [J]. IEEE transactions on green communications and networking, 2025, 9(3): 1429 – 1441. DOI: 10.1109/TGCN.2024.3495236

[11] WOJNAR M, CIEZOBKA W, KOSEK-SZOTT K, et al. IEEE 802.11bn multi-AP coordinated spatial reuse with hierarchical multi-armed bandits [J]. IEEE communications letters, 2025, 29(3): 428 – 432. DOI: 10.1109/LCOMM.2024.3521079

[12] LI B, SUN K, YAN Z J, et al. Idea and theory of particle access [EB/OL]. (2023-05-15) [2025-09-16]. https://arxiv.org/abs/2203.15191

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