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Retraction

Retracted: Signal Optimization of Electronic Communication Network Based on Internet of Things

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] B. Feng, W. Li, and L. Wang, "Signal Optimization of Electronic Communication Network Based on Internet of Things," *Journal of Sensors*, vol. 2022, Article ID 3711776, 8 pages, 2022.

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Research Article

Signal Optimization of Electronic Communication Network Based on Internet of Things

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In order to solve the problem that many people communicate at the same time, there are many external interference factors, and the signal is prone to instability in the process of electronic communication, the author proposes a signal optimization method for electronic communication network based on the Internet of Things. The method takes the cloud trust mechanism as the dynamic evolution trust relationship between various Internet of Things electronic communication services, performs explicit and implicit uncertainty conversion, calculates the objective function of data communication network performance, and confirms the control strategy. The positioning information of the network nodes in the communication is added to the communication data packet, and the most stable electronic communication path in the network is obtained to form the network topology structure. The Krasovsky method is adopted, and the working state of the nodes of the communication network is divided into the congested state and the normal state, the probability of the two is calculated, and the range of the transition balance is determined, so as to realize the optimization of the stability of the network topology. Experimental results show that the transmission rate of this method has been maintained at about 180 Kb/s; although there is fluctuation, the fluctuation value is small and the transmission rate is very stable. *Conclusion*. It can improve the accuracy of electronic communication of the Internet of Things and is less affected by external interference factors, and the communication transmission rate is faster.

1. Introduction

The development of communication technology is inseparable from electronic communication technology, and the design of electronic communication technology system involves various fields of social life and production [1, 2]. The impact of big data analysis on mobile communication network optimization has two sides, it can not only provide a way to find, analyze, and solve problems for mobile communication network optimization but also has a strong complexity, which increases the complexity of fault analysis. The main goal of mobile communication network optimization is to analyze and collect relevant data, apply scientific and reasonable methods, reduce the interference of external factors, eliminate faults, and ensure the stability and security of mobile communication networks [3, 4]. In the context of big data, the structure of the mobile communication network is more complex and the functions are more powerful, and only by fully understanding and mastering the performance of the mobile communication network, in order to improve the efficiency of troubleshooting, create a safe and stable communication environment for users.

In the era of big data, the massive generation of various data has enriched people's life activities to a large extent, and the work efficiency is getting higher and higher, which puts forward higher requirements for the operation quality and carrying capacity of mobile communication networks [5]. In the era of big data, the update speed of mobile terminals is very fast, and the cutting function is more and more powerful; if the quality of the mobile communication network does not meet the standard, it will inevitably have a serious impact on the user experience [6]. Therefore, the design of the mobile communication network on the Internet must meet the premise of user usage and reduce the interference of external factors, so as to maximize the technical flexibility of the mobile communication network. With the continuous development of information technology, a large amount of data is generated every day; through incomplete unification, the amount of data generated is almost rising in a steep straight line [7]. Therefore, one of the most important problems faced by big data analysis in the optimization of mobile communication networks is that the data is too large.

Cloud computing technology is mainly based on resource model and information technology, which is a new computer technology [8, 9]. Because of the characteristics of cloud computing itself and its advantages in practical applications, cloud computing has become an advanced technology used in current computer networks. The characteristics of cloud computing are mainly manifested in strong reliability, versatility, low risk, and virtualization. Among them, virtualization is regarded as the most important feature. Virtualization is realized by means of various hardware facilities and networks, and there is also a very important premise, that is, a resource sharing environment needs to be created first. People can access shared resources at any time, so that they can get various services provided by cloud computing. Figure 1 shows the online monitoring of transmission lines based on IoT wireless communication [10].

2. Literature Review

If a communication company wants to achieve network optimization, it is necessary to do a good job of data acquisition optimization first, in order to further improve the acquisition quality, in order to ensure that the collected data is more authentic and accurate, and in order to meet the needs of network optimization [11, 12]. Therefore, in the actual optimization, the service base should be scientifically designed according to the specific situation of the network, and then, the entire work of data collection should be optimized, so that the relevant personnel can better complete the data sorting and analysis work. Data collection will be affected by many factors, and the location of the base is the most important factor; this requires that the most suitable location and service base should be selected according to the actual situation of the area during optimization, so as to improve the quality of data analysis and collection and provide effective guarantee for the reception of service base signals [13]. In addition, during optimization, the collection of user-related information should be further strengthened according to the actual operation of the network and data collection, and then, the collected information should be used as a basis to create a corresponding data network.

Cloud computing has an obvious feature in application, that is, by storing data in the cloud, it can expand the storage space and facilitate people to call; therefore, in order to achieve network optimization under cloud computing, it is necessary to optimize cloud applications [14, 15]. Faced with this situation, it is required that the network can be perfectly integrated with cloud computing during actual operation, improve the network operation mode, continuously strengthen cloud applications, and further improve the storage and use of cloud resources, thereby expanding the scope of network services and increasing the types of services. After the integration of cloud technology and network, relevant staff also need to analyze cloud data, optimize the structure and procedures of the network itself, and then improve the efficiency of network operation [16].

Song et al. aimed at the communication process of in-vehicle Internet (VANET), due to the problem that the channel state becomes fast and nonstationary due to the dual motion of the transceiver. A nonstationary channel method for vehicular communication is proposed [17]. An integral term is introduced to ensure the continuity of the fading phase of the output channel, and the time-varying characteristics of the transceiver are considered to complete the accurate calculation of the Doppler frequency parameters. In order to improve the two-dimensional servo stability of laser communication, Cheng et al. used the gyroscope correction optimization method, applied the centroid optimization method, gyroscope, CCD (charge-coupled device), the dynamic performance optimization of the two-dimensional servo system is realized by introducing the method of fast convergence of small values in the same direction [18]. However, the previous research methods can only achieve normal communication; if many people communicate at the same time and there are many external interference factors, the communication stability will be poor; to this end, the author adds the location information of the communication network node into the communication data packet, and the most stable communication path is obtained to realize the optimization of communication stability.

3. Methods

3.1. Cloud Trust-Driven IoT Communication Objective Function and Dynamic Model Construction. In cloud computing, the cloud trust mechanism can realize the dynamic evolution trust relationship between IoT and communication services, as well as explicit and implicit uncertainty transformation, which is also one of the important conditions for realizing communication security [19, 20].

Assuming that the data communication network is composed of N nodes and L edges, the link sets of nodes are represented by $\chi, \wp$, respectively, and the specific link $l_t \in \wp, i = 1, 2 \cdots L$ information flow model is shown in Figure 2 [21].

Among them, $\lambda_{st}(t)$ is the input rate of external information flow of link l_i, $\lambda_{ti}(t)$ is the other link in the network, the rate at which information flow is forwarded through l_t, and μ_i represents the information service rate of l_i [22]. Set $x_i(t) \geq 0$ to be the number of packets at time t at l_i (including the number of packets received and queued); that is, $\lambda_{si}(t) = \beta_i \lambda_i(t)$ and $0 \leq \beta_i \leq 1$ are variables of l_i flow control, $\lambda_i(t)$ represents the input rate of source l_i information, $\lambda_{si}(t) = \sum_{I(l)} \mu_I G_l[x_l(t)]$, $\mu_I G_l[x_l(t)]$ represents the dynamic information output of link l at time t, $0 \leq G_l(\cdot) \leq 1$, $l \in \wp$ represents

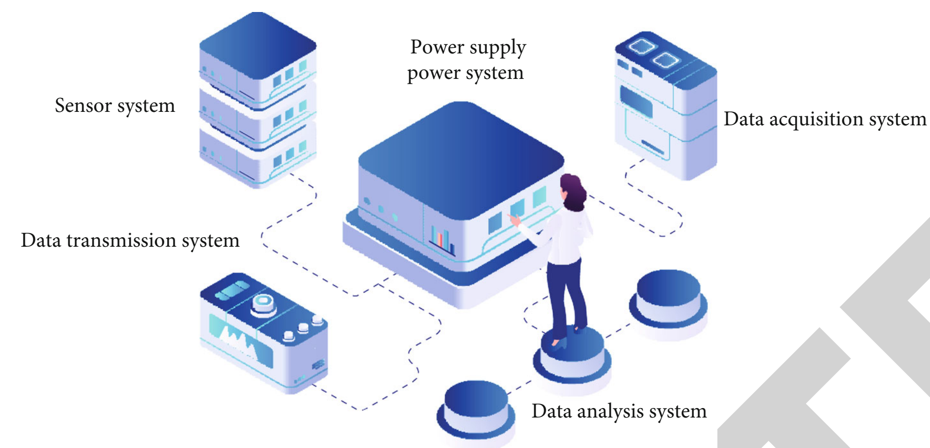

FIGURE 1: Online monitoring of transmission lines based on Internet of Things wireless communication.

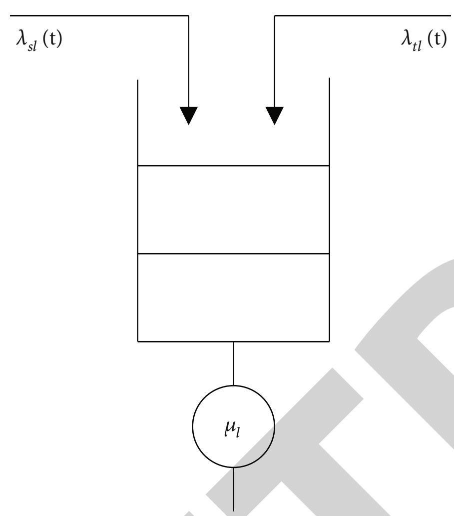

FIGURE 2: Information flow model of the overall link.

the transmission state $x_i(t)$ of link l, and as many factor functions such as link communication protocol, $I(i)$ and $O(i)$, respectively, represent the set of links that input information to link l_i and output information to link l_i [23].

If $x_i(t)$ represents the variable of the $l_i \in L$ state model, then the description formula of the $x_i(t)$ dynamic model is

$$\dot{X}_i(t) = -\mu_i G_i[X(t)] + \sum_{l(i)} \mu_l G_l[X_l(t)] + \beta_i \lambda_i(t). \quad (1)$$

In the computer network, the method of packet switching is used to shorten the average waiting time of users, and to improve the information flow in the network is the main goal of control and optimization. If the reduction in average latency is equal to the reduction in the number of users staying in each network, the number of packets on the link will also be reduced by the formula

$$\min J_1(t) = \sum_{l \in \wp} \int_{t_o}^{t_f} x_l(t) dt, \quad (2)$$

$$\min J_2(t) = \sum_{l \in \wp} \int_{t_o}^{t_f} \left(\varphi_j \beta_j \lambda_j(t) \right) dt. \quad (3)$$

In the formula, $\varphi_j > 0$ represents the network access income of receiving unit information, t_0 and t_f represent the start and end time of the control interval, and the performance objective function selection determines the overall performance and control strategy [24].

3.2. Electronic Communication Stability Optimization

3.2.1. Analysis of Stability Factors of Electronic Communication Network. In the process of optimizing the topology stability in the electronic communication network, at the node position, the network node positioning information in the communication process is added to the grouping of the communication data, so as to obtain the most stable communication path in the electronic communication network, the topology model of the electronic communication network is formed, so as to obtain the topology and distance relationship between the communication signals, and the main factors affecting the topological stability of the communication network are described through this relationship. The steps are as follows:

In the stability optimization process of the network topology in the electronic communication, the range of the communication signal is set to a circle with R as the radius, and the signal B of the electronic communication is within the coverage of the signal A of the communication signal; use u_1 to indicate the communication speed to A, use u_2 to indicate the speed of B communication transmission, and use (x_0, y_0) to indicate the original position of the communication signal A; $(x_0{}'{}', y_0{}'{}')$ represents the original position of the communication signal B, and (x_1, y_1) and (x_2, y_2) represent the real-time positions of communication signals A and B, respectively. The formula for calculating the distance between A and B is

$$d = \frac{(x_0, y_0) \times (u_1 + u_2)t}{\left(x_0{}'{}', y_0{}'{}'\right) \times (x_1, y_2)^* (x_2, y_2)} (A, B). \quad (4)$$

If the transmission distance of the electronic communication signal A at t is d_1 and the distance of the electronic communication signal B at t is d_2, then the distance between the electronic communication signals A and B is S. According to formula (4), the distance between communication signals can be calculated, and the topology model of constructing electronic communication network can be obtained. The specific formula is

$$S_0 = \sqrt{\frac{\left(x_0 - x_0'\right)^2}{d_1(A, B)} + \frac{\left|y_0 - y_0'\right|^2}{d_2(A, B)}}. \tag{5}$$

In the formula, $(x_0 - x_0')$ and $(y_0 - y_0')$ represent constants.

By fusing formula (4) and formula (5), formula (6) can be deduced to represent the topology and distance relationship between electronic communication signals. The specific formula is

$$\omega = \frac{\left(x_0 - x_0'\right)^2 + \left|(x_1 - x_2)_0\right|^2}{d} \times S_0. \tag{6}$$

When the electronic communication signals A and B change during the transmission process, the distance is difficult to keep stable and also changes. Therefore, adding ω in formula (6), using formula (7) to describe the main factors affecting the topological stability of the communication network, the specific formula is

$$p_2 = \frac{\left\{t \middle| \bar{S}_1 \geq \bar{S}_2\right\}}{\omega}. \tag{7}$$

In the formula, $\bar{S}_1, \bar{S}_2$ represents the node degree distribution sequence of the topological upper layer of the electronic communication signals A and B, and the topological stability of the network is described by formula (7), which is the basis for the optimization of communication stability [25].

3.2.2. Stability Optimization Implementation. The Krasovsky method is used to define the main factors affecting the topological stability of the electronic communication network within the stable range, and the working state of the nodes of the electronic communication network is divided into the congested state and the normal state. The range of the probabilistic transition balance between the two is calculated, thereby realizing the optimization of network topology stability. The specific process is as follows:

The state node of normal communication transmission mainly uses α to represent the probability to convert into a congested state node. In the crowded state, β is used to represent the probability of converting to a normal state node. $p_i(t)$ is used to represent the availability probability of the ith node in the network at time t, and the main factors affecting the stability of electronic communication are set in the stable range by the Krasovsky method. The specific formula is

$$\frac{dp_i(t)}{dt} = \alpha p_i(t) \frac{[1 - p_i(t)]k_{i,\lambda} - \beta p_i(t)}{p_2} k. \tag{8}$$

In the formula, $k_{i,\lambda}$ represents the heterogeneous topological structure mode in the communication network.

Taking Equation (8) as the basis, the equilibrium point between the crowded state and the normal state is deduced. The specific formula is

$$\frac{\alpha p_i(t)}{k_{i,\lambda}} = -\beta \times p_i(t) k. \tag{9}$$

Based on formula (9), the value of the equilibrium point is calculated by formula (10). The specific formula is

$$p_0 = 1 - \frac{\beta k_i}{\alpha k_{i,\lambda}} \times \frac{dp_i(t)}{dt} \times \frac{\alpha p_i(t)}{k_{i,\lambda}}. \tag{10}$$

In the formula, k_i represents the frame structure of the communication network data.

Randomly select m transmission nodes of the network in electronic communication, add the calculation result of formula (10) to formula (11), and establish a Jacobian matrix. The specific formula is

$$F(P) = \frac{\partial f(p)}{\partial p_0} = \left[\frac{\partial f_m}{\partial p_1} \times \frac{\partial f_m}{\partial p_m}\right]. \tag{11}$$

In the formula, $\partial f(p)$ represents the in-degree value of the electronic communication network node, ∂P^T represents the out-degree value of the electronic communication network node, ∂p_1 represents the data overflow of the electronic communication network node buffer, and ∂f_m represents the highest connection degree value of the node in the network.

The above Jacobian matrix is a diagonal symmetric matrix, based on the establishment of the matrix, formula (12) is used to convert the stability optimization model of the network topology in the communication, and it is transformed into the working state balance problem of the network nodes. The specific formula is

$$\widehat{F}(P) = \frac{F^T(P) + \mathrm{Ft}(P)}{p_0} = 2 \mp [\alpha - 2\alpha p_i(t)]. \tag{12}$$

In the formula, $F^T(P)$ represents the communication link bandwidth of the network.

Using Krasovsky's method, the $\widehat{F}(P)$ is brought into the set communication network stability limit, and the specific formula is

$$(\alpha - 2\alpha p_i(t))k_i - \beta k_i = \frac{F(P)}{\widehat{F}(P)} \times p_i(t). \tag{13}$$

In the formula, the condition $\alpha \leqslant \beta$ must be satisfied.

Through the formula (13), the concept conversion balance range of the electronic communication network (congested state and normal state) can be obtained. The specific judgment formula is

$$i = \sum_{i=1}^{n} \frac{\alpha - \beta}{2\alpha} \otimes \frac{[\alpha - 2\alpha P_i(t)]k_i - \beta k_i}{F(P)}. \quad (14)$$

By setting a reasonable range of electronic communication network conversion balance, the stability optimization of electronic communication network can be realized.

3.3. Simulation Proof

3.3.1. Experimental Environment. In order to verify the effectiveness of the proposed method, the simulation environment is set as follows: "Pentium" (R) "Dual-Core" CPU, 2.8 GHz, 4 GB "RAM," Windows 732 bit, and "MATLAB R2013a." The simulation analysis is carried out in the simulation platform Net Logo, and the data rate of the user is set to 200 Kb/s, the bandwidth is 4 M, the communication radius is 15 m, and the network area size is 1000 ∗ 1000. The specific experimental data are shown in Table 1.

Table 1: Experimental environment.

Experimental parameter name	Numerical settings
Experimental scene (L·W)	150 m ∗ 100 m
Number of network nodes (N)	30~50
Maximum transmission radius	15 m
Threshold radius (r)	7.5 m
Moving speed (u)	0.5 m/s~5 m
Pause time	Os
Weight factor	$W_1 = W_2 = 1$
Starting distribution	Evenly distributed
Data transfer interval	3 s
Experimental test time	500 s

4. Results and Discussion

4.1. Analysis of Experimental Transmission Accuracy. The communication transmission accuracy optimized by the proposed method is analyzed, and the specific results are shown in Figure 3.

By observing Figure 3, it can be seen that when the number of experiments is 10, the communication accuracy of the proposed method is 98%. Although there were slight fluctuations in the experimental results after that, the difference was not large and remained above 95%, and only when the number of experiments was 40, accuracy was greatly reduced, with an average of 88%, after a record investigation. It was found that the reason for this phenomenon was that the test user made mistakes in the transmission process, resulting in inaccurate part of the experimental data, the experimental results obtained in the end have deviations, and when the number of experiments reaches 50, the external interference disappears, and the accuracy recovers to more than 95%. Until the end of the experiment, the accuracy of the proposed method is maintained at more than 95%, indicating that the proposed method data transfer can be performed efficiently.

4.2. Comparative Analysis of Transmission Rate. Under the same conditions, the communication transmission efficiency is selected as the comparison result of this experiment, and the number of experiments is 60 times. Then, the proposed method is compared with the nonstationary channel simulation method for Internet of vehicle communication, and the dynamic performance optimization system of servo stability system for mobile laser communication equipment is used for comparison. The specific comparison results are shown in Figure 4.

By observing Figure 4, it can be seen that the transmission rate of the proposed method has been maintained at about 180 Kb/s. Although there is fluctuation, the fluctuation value is small, and the transmission rate is very stable. The nonstationary channel simulation method for IoV communication is maintained at about 130 Kb/s, and the fluctuation is also small and relatively stable, but the transmission rate is low. However, the dynamic performance optimization system of the servo stabilization system of mobile laser communication equipment has a transmission rate of 90 Kb/s when the number of experiments is 10, and the subsequent experiments show large fluctuations, and the curve fluctuates up and down, which cannot meet the actual needs.

The load simulation is carried out in the simulation environment, by simulating the simultaneous communication state of multiple users, it is observed whether the communication process will be crowded, and the transmission efficiency will be reduced. The specific results are shown in Figure 5.

By observing Figure 5, it can be seen that when simulating the communication of 100 users at the same time, the transmission rates of the three methods are almost the same, and the difference is not large. When simulating 500 users, there is a small difference in the transmission rate among the three, while when simulating 2000 users, the transmission rates of the three methods have significant differences. At the end of the experiment, the transmission efficiency of the proposed method is reduced to 85%, the nonstationary channel simulation method for IoV communication is reduced to 65%, and the dynamic performance optimization system of the servo stabilization system of mobile laser communication equipment is reduced to 50%. Although all three methods increase with the number of communications, as a result, the transmission rate of communication is reduced, but the proposed method decreases less than the other two methods, which shows that after the proposed method optimizes the transmission stability, not only the communication accuracy is high but also the transmission rate is also obvious.

4.3. Comparative Analysis of External Interference. In order to further prove the application effect of the proposed

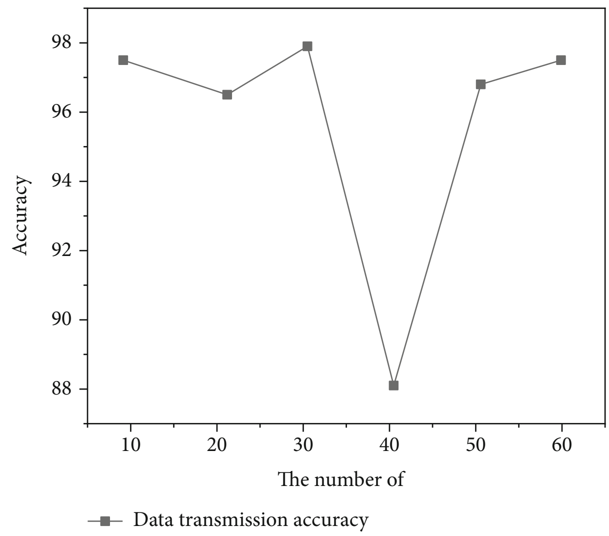

FIGURE 3: Data transmission accuracy results after stability optimization of the proposed method.

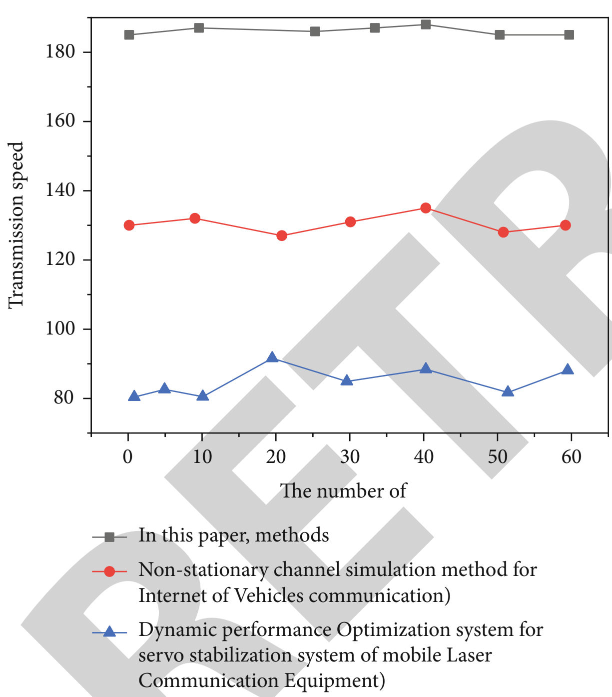

FIGURE 4: Comparison results of transmission rates of three methods.

method, the external interference signal is artificially created, at the same time, in order to avoid the communication distance being too close, and the artificially created interference signal has no effect or cannot clearly reflect the strength of the communication interference signal and increase the communication distance so that the transmission signal is in a state of weak transmission. The proposed method is compared with the nonstationary channel simulation method for IoV communication and the dynamic performance optimization system of the servo stabilization system

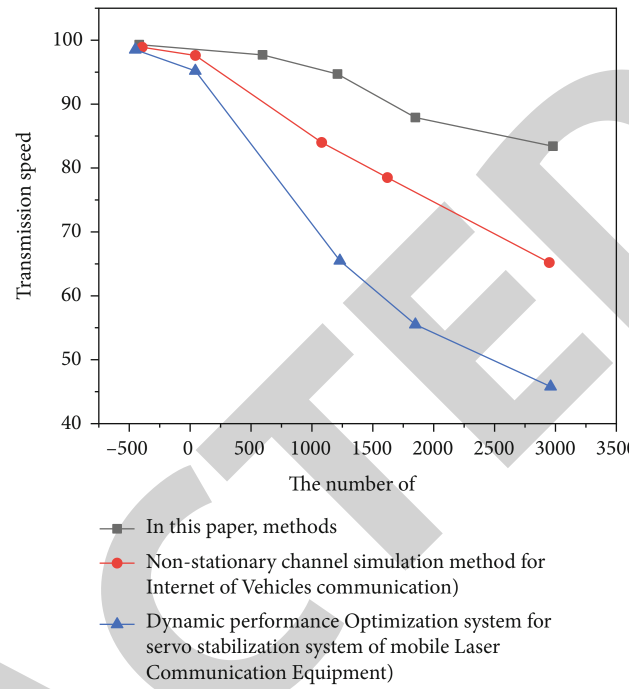

FIGURE 5: Comparison of the results of simultaneous communication with the number of individuals in the three methods.

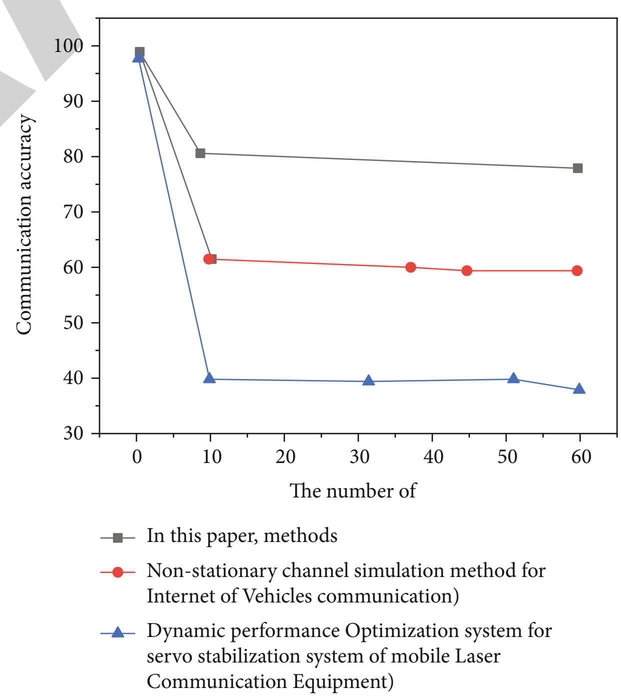

FIGURE 6: Comparison of three methods of communication signal transmission.

for mobile laser communication equipment under the same conditions. The specific results are shown in Figure 6.

By observing Figure 6, it can be seen that under the influence of external interference signals, the proposed method adopts the Krasovsky method, and the main factors affecting the topology stability of the electronic communication network can be determined as a fixed range; therefore, although the communication signal dropped slightly, when it dropped to 80%, it almost stopped dropping, maintaining the current signal state, during data transmission, and there is no data loss, while the nonstationary channel simulation method for IoV communication shows a significant drop, and when it drops to 60%, there is a slight data loss. However, the dynamic performance optimization system of the servo stabilization system of the mobile laser communication equipment drops to 50%. During the communication process, the data is seriously lost and even cannot be transmitted.

5. Conclusion

The author proposes the optimization of electronic communication network signals based on the Internet of Things and proposes a cloud trust-driven Internet of Things electronic communication stability optimization method. When the accuracy of communication signals drops to 80%, almost no longer drops, maintaining the current signal state, and the transmission rate has been maintained at about 180 Kb/s, indicating that after stability optimization, not only the accuracy of communication transmission is high, and when multiple people transmit, the transmission rate is faster and the stability is stronger. In future research, it is not only necessary to make the communication process more stable but also to improve the speed, scope, and complexity of communication, so as to cope with the uncertainty of scientific development and communication scenarios.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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References

[1] X. Xu, L. Li, and A. Sharma, "Controlling messy errors in virtual reconstruction of random sports image capture points for complex systems," *International Journal of Systems Assurance Engineering and Management*, vol. 3, 2021.

[2] M. Bradha, N. Balakrishnan, A. Suvitha et al., "Experimental, computational analysis of butein and lanceoletin for natural dye-sensitized solar cells and stabilizing efficiency by IoT," *Environment, Development and Sustainability*, vol. 24, no. 6, pp. 8807–8822, 2022.

[3] J. Chen, J. Liu, X. Liu, W. Gao, J. Zhang, and F. Zhong, "Degradation of toluene in surface dielectric barrier discharge (SDBD) reactor with mesh electrode: synergistic effect of UV and TiO_2 deposited on electrode," *Chemosphere*, vol. 288, p. 132664, 2022.

[4] R. Huang, S. Zhang, W. Zhang, and X. Yang, "Progress of zinc oxide-based nanocomposites in the textile industry," *IET Collaborative Intelligent Manufacturing*, vol. 3, no. 3, pp. 281–289, 2021.

[5] H. Xie, Y. Wang, Z. Gao, B. Ganthia, and C. Truong, "Research on frequency parameter detection of frequency shifted track circuit based on nonlinear algorithm," *Nonlinear Engineering*, vol. 10, no. 1, pp. 592–599, 2021.

[6] A. Qazi, G. Hardaker, I. S. Ahmad, M. Darwich, and A. D. Ahad, "The role of information & communication technology in elearning environments: a systematic review," *IEEE Access*, vol. 9, pp. 45539–45551, 2021.

[7] I. Raça, F. Dosseville, and O. Sirost, "Analysis of the influence of individual representations on the modalities of practice in longe-cte. towards a perception of the marine environment generating a hybrid socialization based on adventure, nomadism and awakening," *Movement & Sport Sciences - Science & Motricité*, vol. 2022, no. 115, pp. 57–67, 2022.

[8] R. Szmytkie, A. Latocha, D. Sikorski, P. Tomczak, K. Kajdanek, and P. Miodońska, "Tourist boom and rural revival-case study of Klodzko region (SW Poland)," *Journal of Mountain Science*, vol. 19, no. 4, pp. 909–924, 2022.

[9] C. Huang and L. Zhu, "Robust evaluation method of communication network based on the combination of complex network and big data," *Neural Computing and Applications*, vol. 33, no. 3, pp. 887–896, 2021.

[10] T. Szul, "Application of a thermal performance-based model to prediction energy consumption for heating of single-family residential buildings," *Energies*, vol. 15, no. 1, p. 362, 2022.

[11] W. A. Jadayil, M. Shakoor, A. Bashir, H. Selmi, and M. Qureshi, "Using serviqual to investigate the quality of provided wireless communication services in UAE," *International Journal of Quality and Service Sciences*, vol. 12, no. 1, pp. 109–132, 2020.

[12] J. A. Neyra and G. N. Nadkarni, "Continuous kidney replacement therapy of the future: innovations in information technology, data analytics, and quality assurance systems," *Advances in Chronic Kidney Disease*, vol. 28, no. 1, pp. 13–19, 2021.

[13] X. Lv and M. Li, "Application and research of the intelligent management system based on Internet of Things technology in the era of big data," *Mobile Information Systems*, vol. 2021, Article ID 6515792, 6 pages, 2021.

[14] N. A. M. Said, N. E. Mustaffa, and H. L. T. Ariffin, "Integrating cloud in engineering, procurement and construction contract," *Journal of Computational and Theoretical Nanoscience*, vol. 17, no. 2, pp. 893–901, 2020.

[15] W. Wang, X. Du, D. Shan, R. Qin, and N. Wang, "Cloud intrusion detection method based on stacked contractive autoencoder and support vector machine," *IEEE transactions on cloud computing*, vol. 6, 2020.

[16] H. Li, G. Zhao, L. Qin, and Y. Yang, "Design and optimization of a hybrid sensor network for traffic information acquisition," *IEEE Sensors Journal*, vol. 20, no. 4, pp. 2132–2144, 2020.

[17] J. Song, L. Meng, and J. Chang, "Delivery service optimization when the information on the consumers' time values is asymmetric," *Mathematical Problems in Engineering*, vol. 2020, Article ID 8247179, 8 pages, 2020.

[18] Z. Cheng, S. Jian, T. H. Rashidi, M. Maghrebi, and S. T. Waller, "Integrating household travel survey and social media data to improve the quality of od matrix: a comparative case study," *IEEE Transactions on Intelligent Transportation Systems*, vol. 21, pp. 2628–2636, 2020.

[19] L. Li, J. Wang, and X. Li, "Efficiency analysis of machine learning intelligent investment based on k-means algorithm," *IEEE Access*, vol. 8, pp. 147463–147470, 2020.

[20] M. Aggarwal, A. Malik, and M. Madhukar, "Effective cryptographic renewal method with Rivest-Shamir-Adleman, modified artificial bee colony optimization to achieve secure cloud storage and computation in cloud computing," *Journal of Computational and Theoretical Nanoscience*, vol. 17, no. 6, pp. 2699–2705, 2020.

[21] L. Mu, P. Yao, Y. Zheng, K. Chen, and N. Qi, "Research on slam algorithm of mobile robot based on the fusion of 2D LiDAR and depth camera," *IEEE Access*, vol. 8, pp. 157628–157642, 2020.

[22] D. L. Sheinberg, E. Luther, S. Chen, D. Mccarthy, and R. M. Starke, "Recurrent syncope caused by a dural arteriovenous fistula," *The Neurologist*, vol. 26, no. 2, pp. 62–65, 2021.

[23] B. S. Kandemir, "The stability of two-dimensional magnetobipolarons in parabolic quantum dots," *The European Physical Journal B-Condensed Matter and Complex Systems*, vol. 37, no. 4, pp. 527–533, 2004.

[24] C. Li, J. Li, Z. Xu, and J. Wang, "Study on the k-connectivity of UV communication network under the node distribution of RWP mobility model in the arbitrary polygon area," *IEEE Photonics Journal*, vol. 12, no. 4, pp. 1–12, 2020.

[25] J. Zhang, "Cloud trust-driven hierarchical sharing method of Internet of Things information resources," *Complexity*, vol. 2021, Article ID 5573103, 11 pages, 2021.