# Specific Strategies for Selection of 5G Networks Based on Computer NDN Technology



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**Abstract.** 5G network is the main point of mobile communication research, as a new generation of mobile communication system, compared with 4 G network over-frequency utilization and energy efficiency, transmission rate and resource utilization is higher, user communication quality has been improved. This paper analyzes the 5 G fusion network access selection strategy under the framework of NDN technology network to determine the most suitable analysis method and algorithm to reduce the influence of various factors.

**Keywords:** Computer, NDN Technology, 5 G, Strategy

## 1. Introduction

With the rapid development of wireless communication technology and Internet technology, the trend of wireless network isomerization will become more and more obvious. For 5 G, the hyperplastic heterogeneous network can provide a better service for the user, so that the user can communicate at any place, at any time, and keep the communication uninterrupted in free movement to obtain the optimal user experience [1]. In ultra-differentiated heterogeneous networks, many wireless networks with different structures have the same region, which means that one user terminal will be covered by multiple wireless networks. Therefore, how users choose the most effective and appropriate access network to meet their own business needs will become the research hotspot in the fifth generation mobile communication. For 5 G, it is of great practical significance and academic value to study and design the network selection strategy of ultra-dense heterogeneous networks. From the point of view of network, we can effectively control network traffic, realize network load balancing, and improve system performance; from the point of view of users, we can obtain the optimal resource allocation and improve the user experience. Hence, 5 G network selection strategy is the problem to be studied in this paper.

## 2. NDN Network Architecture

### *2.1. Architecture*

NDN advantage of network architecture is not only in naming all content data in the network according to the content itself, but also in its security mechanism based on the data itself and various routing policy choices. In the aspect of data security, the content data are encrypted and signed directly by the application process to realize the control of data security. The policy layer is responsible for managing several functions of forwarding, routing selection and storage in routing policy selection. Its outstanding feature is that it can simultaneously utilize 3 G、 Bluetooth and WIFI and other connection modes, and can flexibly switch to the optimal connection mode in a dynamic environment.

### *2.2. Naming System*

Compared to TCP/IP network, NDN network not only realizes content-centered communication mode through hierarchical naming, but also realizes the sharing of content data. At the same time, it can also support the environment such as time-varying, intermittent connection and mobility well [2]. Hierarchical naming has high openness and flexibility, applications can name their required content data according to actual requirements, and applications can also distinguish different processing modules through different naming methods.

### *2.3. Node structure*

NDN network nodes in the network architecture are mainly blue-like data structures, which are content storage area, package table to be processed, and forwarding information table. Figure 1 is a schematic diagram of NDN nodes.

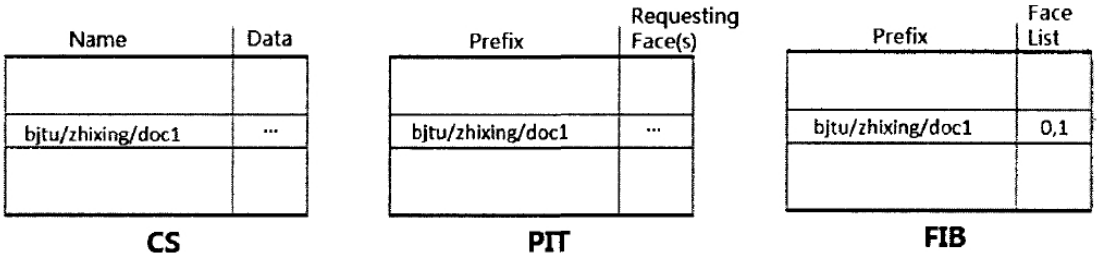


**Figure 1.** NDN Node schematic

### *2.4. NDN package processing process*

NDN the network communicates in a data-driven manner and the content data requester constructs the interest packet and forwards it from the corresponding interface. The node receiving the interest packet in the network responds if the cache has the corresponding content data. Figure 2 is a schematic diagram of the NDN packet forwarding mechanism.

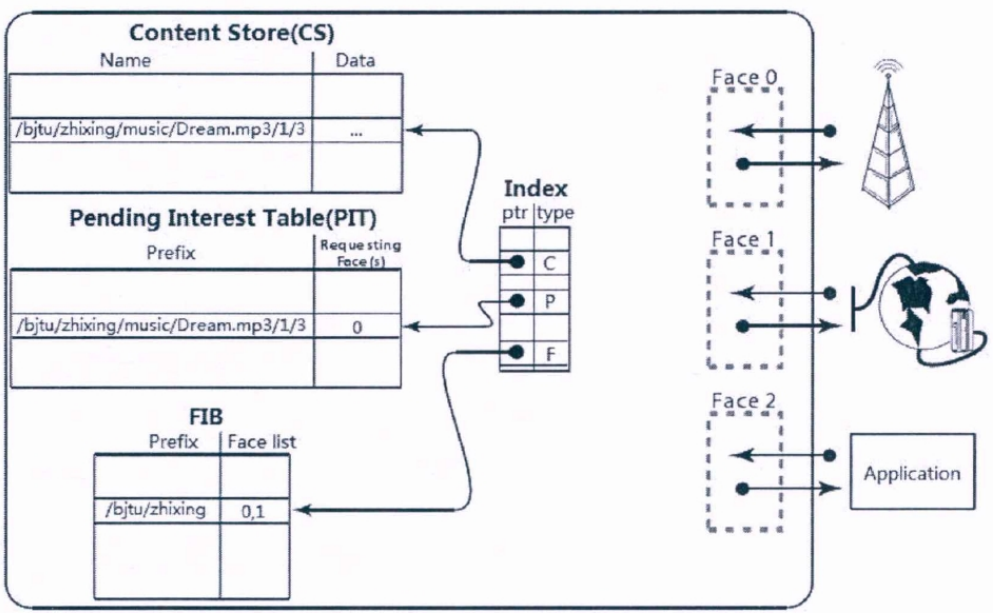


**Figure 2.** NDN Schematic diagram of packet forwarding mechanism

## 3. Communication System Model Based on NDN

Among the traditional heterogeneous network selection algorithms, the most common is the network selection algorithm based on signal strength PSI. In this algorithm, signal strength is regarded as the main determinant of network selection. Considering that the network selection algorithm based on signal strength is too single-factor-, researchers proposed a hierarchical analysis-based network selection algorithm PS1, which considers a variety of information sources and can be used to deal with network selection in more complex scenarios. In NDN-based network selection, the scenario of network selection becomes more complex. The biggest difference between the NDN network and the traditional TCP/IP network is that the NDN network completely abandoned the IP address addressing and chose the content-driven way, all requests and forwarding in the network are based on the content data; name and the content data; name is the unique identity related to the content data skillfully [3]. Cache is arranged in SBS nodes. Content data is stored in the near-user, and the mobile user-oriented SBS nodes with corresponding data will greatly improve the user experience through network selection. Based on the NDN network is the content of the network. This paper will pay more attention to the user's request analysis, according to the user's request to make the corresponding network selection decision. Therefore, this paper proposes that the user request data will be highlighted in the process of network selection.

## 4. The Factors Influencing the Selection of 5 G Networks under NDN Technology

In order to meet the demand that users can connect to the optimal access network at anytime and anywhere, access network selection strategy is very important. In the selection of the access network, many factors affect the decision of network selection, including: received signal strength, delay, packet loss rate, security and so on. In this paper, the following factors will be considered synthetically: the request preference of the user, the current situation of the network and the mobile terminal, and the type of application. Figure 3 illustrates the evolution of mobile communication systems

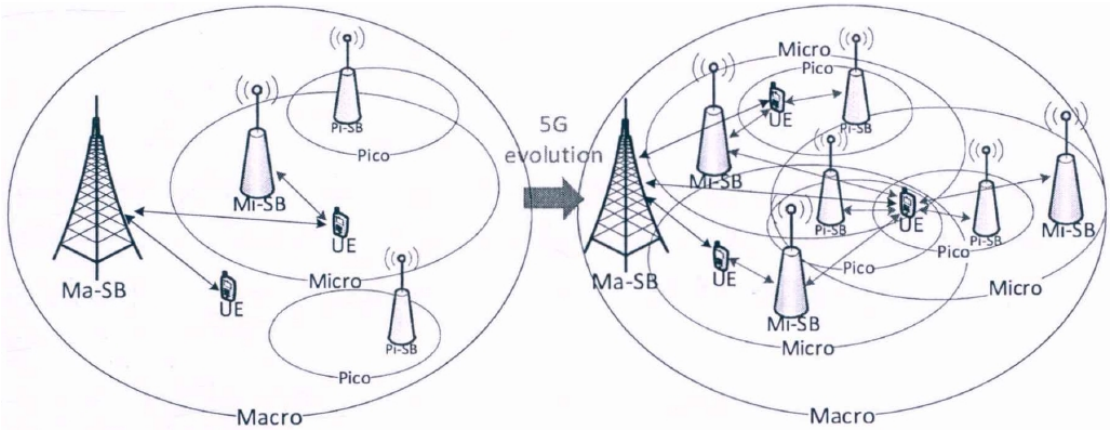


**Figure 3.** Schematic diagram of the evolution of mobile communication systems

*4.1. User request preference information*

During the selection of access network, in order to make users participate in the decision of network selection; the information of user request preference can be considered in the decision of network selection, and the network can be selected according to the user's request preference. In traditional TCP/IP networks, if you want to obtain the request preference information of the user, you must unpack the request packet analysis. NDN network is driven by data requester compared to traditional TCP/IP networks [4]. NDN network architecture, the user's request content is the name of the switch item interest package, and the user request preference information can be obtained directly by switching the name of the item interest package. Meanwhile, in mobile communication systems based on NDN network architecture, all SBS nodes cache some content data in the network.

*4.2. Current status of networks and mobile terminals*

Network and mobile terminal conditions mainly include :(1) receiving signal intensity, which directly reflects the current situation of access network, the intensity change is related to the distance between UE and SBS ;(2) delay, although the different data requirements of users request different degree of severity of delay, but for users, it is bound to tend to minimize the delay to a certain extent ;(3) network load, the main consideration is to meet the needs of users to achieve network load balancing, effectively improve the utilization of network resources ;(4) Mobile speed: the user's mobile speed will affect the relative position and distance between the UE and the SBS, thus affecting the signal strength and other network related factors, can be used as a network performance prediction, while the consideration of mobile speed can effectively avoid the phenomenon of frequent switching due to higher mobile rate ;(5) SBS coverage: the smaller the coverage SBS the greater the limit on mobile user's mobile speed [5]. Some of these parameters are collected periodically through the network interface of the mobile terminal, while the other part is collected periodically by the network side.

*4.3. Type of application*

The different needs of users are divided according to the application type, which mainly includes four application types: business type, session type, streaming media type, interaction type and background type. Different application types have different severity on transmission delay, transmission rate, security and so on. For example, in voice call applications, mobile users tend to choose access networks with the least transmission delay; in file transfer services, mobile users pay more attention to

the transmission rate.

## 5. Specific strategies for selection of 5 G networks based on computer NDN technology

### *5.1. One match*

First, the user sends a matching request to the network with the highest preference value in their preferential sorting. After the matching request is sent to the network end, the network end will check their preference sorting, then check the ranking of each user in their preference sorting, and accept the top ranked user. If a user request is not accepted by the network side, the user request will go in and match twice; if the user request is accepted by the user side, then the user is in a "matched" state and the user request is deleted while the network is not affected and the other users will continue to be accepted household's request [6].

### *5.2. Secondary match*

Secondary matching is to avoid user matching failure due to other user problems. The user can make a second match after one match fails. There are some differences between quadratic matching and primary matching. The most important difference is that the sequence of users in the preference ranking of the network is different. If the user fails to match twice, at this time the user will give up access to the network and directly apply for access to the next network in its preference ranking [7]. In the matching process, as long as the other users match successfully, it will cause the preference order of the network to change, at which time the user may access successfully in the next match. Therefore, as long as other users match successfully, the secondary matching process will not end. The complete end of the secondary matching process means that the user match fails.

### *5.3. Matching window adjustment*

Once there is a successful user matching in the access network, the network parameters will change with it. At this time, the network end and the user need to adjust their preference sequence in time to ensure that the next matching is normal. On the client side, in order to complete the subsequent matching, the user needs to change the preferences of the computer network according to the network parameters; for the network side, it only needs to delete the successful matching user. Client matching window adjustment, can be applied once GAHP algorithm, it is important to note that to eliminate the matching successful users in the preference network, and then add the unmatched users to the network in order to complete the adjustment of the network end, to facilitate the smooth progress of the subsequent matching work.

### *5.4. Simulation and Analysis*

The development of mobile communication system is bound to reach the common state of many kinds of wireless access networks and become more complex heterogeneous networks which complement each other. Five G fusion network access selection strategies are analyzed, assuming that each network has the same number of users carrying, business requests include four kinds of interaction class, session class, stream media class and background class, and the probability of service in user initiation in simulation environment is the same. Using GAHP algorithm to determine the original data of each QoS parameter of the network, combined with the actual survey results of operators, set the price and security of each network. The original data will change with the user's access. Fuzzy and normalized QoS parameters are raw data, the correlation degree matrix between QoS parameters can be obtained,

and the wideband and data transmission rate correlation degree can be determined, which is the main factor affecting the accuracy of network selection. Then determine the weight of different services on each QoS parameter, combined with the QoS decision matrix obtained by the final QoS parameter data, get the network ranking selection under four kinds of services, and determine the candidate network corresponding to each service according to the progress of each network paste.

## 6. Conclusion

5G network fusion is an important application development direction of mobile communication network. With the help of computer NDN technology to optimize network selection, through seamless mobility management, transparent access between networks, effective use of resources and other ways, can greatly improve the utilization of network equipment, but also enable users to have a better experience, and then enhance user satisfaction. Accordingly, relevant personnel should strengthen the research on 5 G fusion network and design the best access selection strategy.

## References

[1] Du Shuangyan. Analysis on Access Selection Strategy of 5G Fusion Network [J].Network and Information Engineering, 2018.

[2] Zheng Xiaolin. Research on 5 G Network Selection Strategies Based on NDN Architecture [D].2016.

[3] Zheng Wensan. Study on Access Selection Strategy of 5G Fusion Network [D].2016.

[4] Fan Qiang. A Study on User Access Control and Resource Allocation Mechanism in Wireless Heterogeneous Networks [D].University of Science and Technology of China ,2017.

[5] Qu Lili, qu Wenyan. The Challenges and Countermeasures of Network Transmission Technology G Unicom [J].Information and Computers, 2019(13):152-153.

[6] Guo Chen, Zheng Quan, Ding Yao, etc. NDN network caching strategy based on content heat and node[J].Computer Systems Applications. 2017,026(012):165-169.

[7] Feng Yannan. A Study on Selection Strategy and Algorithm of Heterogeneous Wireless Network Access [D].Zhejiang University, 2014.