Perspective

ASSESSMENT OF NETWORK BEHAVIOR UNDER DIFFERENT OPERATING CONDITIONS

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DESCRIPTION

Over the last decade, wireless and mobile technologies have grown at an exponential rate. Indeed, cellular networks have gone through five generations of technological advancement, from 1G to 5G. Furthermore, in most affluent countries as well as many developing countries, wireless local area networks (LANs) are positioned to augment wired networks. The major purpose of a technology transition is to provide a significant boost in performance by allowing wireless devices to efficiently access the Internet and multimedia apps, increasing security services, and establishing a set of quality of service changes among other things.

The rate of innovation in wireless technology has grown in recent years. Unproven protocols cannot be implemented on a big scale in computer networks due to the uncertainty of their success. As a result, the most recent protocols are put to the test using analytical modeling tools. If the latest protocols produce positive results after simulation, they will be implemented in the actual world. Network simulation is the most frequent and practical way for calculating different network topologies that is not based on real-world implementation. The research community makes considerable use of these to estimate new theories and hypotheses. Simulators come in a variety of shapes and sizes, but choosing the right one for your research is crucial.

Network simulation

In computer network research, network simulation is a method in which a software programme models the functioning of a network by evaluating the relationships between various network entities such as links, switches, routers, nodes, and access points. In an analysis lab, network performance, various applications, services, and supports can be monitored. Different aspects of the environment can also be altered in a controlled manner to see how the network protocols perform under various conditions.

A network simulator is a piece of software that is used to estimate the performance of a computer network. These are utilized when fixed analytical methodologies are no longer able to provide a precise knowledge of system performance due to the complexity of communication networks. The computer network can be moulded with the help of links, devices, and applications in a simulator, and the network's performance can be reported. These are made possible by today's networks and technologies, such as IoT, 5G, WLANs, mobile ad hoc networks, WSNs, LTE, vehicle ad hoc networks, and so on. This is a technique for testing the behavior of actual applications over a virtual network. This differs from network simulation, which uses just mathematical representations of traffic, channels, protocols, and network models. The major purpose of this is to evaluate performance, quantify the impact of change, and otherwise improve technology decision-making.

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Different types of network simulations

Network simulator version 2 (NS-2): It is an object-oriented simulator that is mostly used to simulate networking protocols as well as routing techniques for wired and wireless networks. OTCl and C++ can be used to implement these.

Network simulator version 2 (NS-3): This type of simulator is priJunily used for educational and research purposes. When compared to the Ns2 type it makes better use of Python due to the low level of abstraction. Protocols and network devices are among the Ns3 modules, which are built in C++ and Python.

Netki: It is a user-mode Linux-based open-source programme. This simulator is used whenever a small group of people needs to build a networking environment. It's a command-line-based simulation programme. It can also be used to establish a complete network using VN (virtual network) devices on a single PC.

Simulation in Java (JSIM): It is mostly used in web-based simulations to create by using the event package, but it may also be used to process the package. This is used to create quantitative numeric models and estimate them using the experiment's data.

OPNET: It is utilized in R&D to give researchers complete flexibility while researching communication networks, protocols, and applications. It gives a platform for the user to construct a network when they require it when it comprises both a programming environment and a graphical user interface.

QualNet: Engineers and academics use it to create virtual models for a variety of data, audio, and video networks. It is, in reality, a tool for testing, planning, and training that is used to accurately represent the network environment.

Benefits of network simulation

The following are some of the benefits of network simulators.

• The fundamental benefit of a simulator is that it provides users with practical feedback while they are creating real-world systems.

• They enable the system's designers to investigate problems at various abstraction levels.

• These are effectively utilized to teach or show topics to students in a variety of ways.