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Study of Wireless Network and its Simulation Using NS2 Simulator

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Abstract— Wireless networks are computer networks that are not associated by cables of any sort. The utilization of a wireless network empowers endeavors to stay away from the exorbitant procedure of bringing cables into structures or as an association between various hardware areas. The premise of wireless systems is radio waves, an execution that happens at the physical dimension of system structure. NS2 represents Network Simulator Version 2. It is an open-source event driven test system structured explicitly for research in computer communication networks. The principle objective of this paper is to figure out how to utilize reenactment for planning and concentrate wireless networks.

Keywords-Wireless network; computer, NS2, Simulator.

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I. INTRODUCTION

Wireless networks utilize radio waves to interface gadgets, for example, PCs to the Internet, the business system and applications. At the point when PCs are associated with Wi-Fi problem areas out in the open places, the association is set up to that business' wireless network [1].

wireless network is a computer network that is wireless, and it is generally connected with a media communications network whose interconnections between nodes are executed without the utilization of wires. Wireless telecommunications networks systems are commonly executed with some sort of remote information transmission framework that utilizes electromagnetic waves, for example, radio waves, for the transporter and this usage ordinarily happens at the physical dimension or "layer" of the network [7].
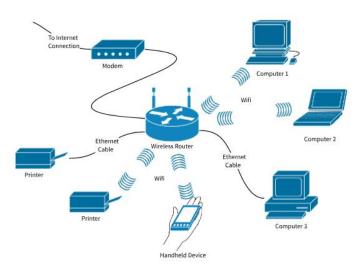

Figure 1: Wireless Network

Figure 2: wireless network diagram

A wireless network diagram outwardly presents to a network that is associated by wireless signals and satellites as opposed to by links. Wireless signals are portrayed by lightning bolts and waves instead of lines. These outlines distinguish the connections between various parts and are key documentation apparatuses for IT experts and planners.

II. TYPES OF WIRLESS NETWORK

A network is a gathering of gadgets associated with each other. On account of wireless network, radio communication is generally the mechanism of decision. In any case, even inside the radio-powered subset, there are many distinctive innovations intended for use at various scales, topologies, and for drastically extraordinary use cases. One approach to delineate this distinction is to segment the utilization cases dependent on their "geographic range" [2]:

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Type	Range	Applications	Standards
Personal area network (PAN)	Within reach of a person	Cable replacement for peripherals	Bluetooth, ZigBee, NFC
Local area network (LAN)	Within a building or campus	Wireless extension of wired network	IEEE 802.11 (WiFi)
Metropolitan area network (MAN)	Within a city	Wireless inter-network connectivity	IEEE 802.15 (WiMAX)
Wide area network (WAN)	Worldwide	Wireless network access	Cellular (UMTS, LTE, etc.)

III. BENEFITS OF A WIRELESS NETWORK [3]

INCREASED MOBILITY

Increased mobility is by a wide margin the greatest fascination that ireless networking holds for generally organizations. Having the capacity to sit at any terminal, anyplace in the building and access the server is an incredible favorable position.

At the point when laptops were produced, as a result of the new versatility accommodation factor that they brought inside them, this gave added stimulus to the upsides of having the capacity to work anyplace inside scope of the wireless network signal. It implies that not exclusively can workers presently get to data from the server, wherever they are in the premises, however it additionally empowers partners to team up and share data in gatherings held anyplace; either in an edge of the workplace, a bespoke gathering room, or even the staff container. It empowers all out mobility.

ENABLING BYOD

The increased mobility factor both empowers and encourages the Bring Your Own Device (BYOD) wonder, which an ever increasing number of organizations are presently exploiting. Workstations, Tablets, and Smartphones that have a place with individual representatives are currently being brought into the work environment and are being given access rights to the wireless network. Too, as making it progressively advantageous for representatives to complete their errands, BYOD likewise speaks to a potential cost sparing, as organizations never again need to subsidize the equipment cost of the gadgets themselves.

INCREASED PRODUCTIVITY

Another imperative result of the increased mobility factor is that it advances expanded productivity, enabling workers to team up where and when they have to. It brings opportunity of activity and accelerates the working procedure. Be that as it may, there is another factor as well, and that will be that representatives take their gadget's home with them, and can work, (the same number of do), voluntarily when it's helpful to do as such.

PUBLIC WI-FI - HOTSPOTS

Wireless networking has additionally gone into the public domain, with Wi-Fi hotspots being accessible in numerous high road bistros, lodgings, railroad stations, airplane terminals, colleges, emergency clinics, and so on. It empowers individuals to get onto the Internet when they're far from the workplace, or far from home. Individuals can get their messages, both social and business, and if their work environment permits, can likewise associate into the business network remotely.

SCALABILITY

One of the natural issues with a wireless network is adapting to expansion. Including extra cabling, and reroute existing links, can be a troublesome and exorbitant process. While each organization should prepare when introducing a remote system, it is practically difficult to conjecture future necessities precisely except if sound arranging is done.

GUEST USE

Having a wireless network likewise implies that a business can give secure network access to visiting partners from different locales inside the association. It empowers them to get to the information they need and get and react to their messages.

USING VOIP

Another of the advantages of having a wireless network is that it very well may be utilized to make phone brings utilizing voice over Internet convention. VoIP calls are frequently free, contingent upon the nation and the gadgets you are calling, and are impressively less expensive than utilizing customary innovation to make international calls.
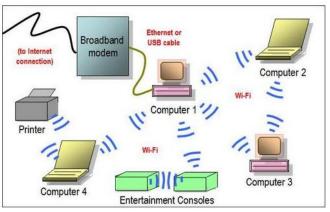
WI-FI IS COST EFFECTIVE

Utilizing wireless technology as opposed to having a hard wired network can be considerably more cost-effective. The bigger the system, both as far as territory and clients, the more costly a hard wired system will be to introduce. It's the measure of cabling as well as the real expense of the work to introduce the raceways, and pursue the cabling all through the premises; through dividers, here and there various floors and so forth.

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HEALTH AND SAFETY

Since there are no wires required with a wireless connection, the potential danger of stumbling over any trailing links that wired availability requires, can be stayed away from inside and out.

IV. WIRELESS NETWORK ARCHITECTURE [4]

In arranging the wireless network, we should figure out which wireless network architecture to embrace in the network environment. There are two designs accessible, specifically standalone and centrally coordinated wireless network.

Standalone architecture (Ad hoc mode)

Figure 3 : Ad hoc mode

By utilizing ad hoc mode, all gadgets in the wireless network are straightforwardly communicating with one another in shared correspondence mode. No passageway (routers/switches) is required for correspondence between gadgets.

For setting up ad hoc mode, we have to physically design the wireless adaptors of all gadgets to be at specially appointed mode rather than infrastructure mode, and all connectors must utilize a similar channel name and same SSID for making the association active.

A ad hoc mode utilizes the incorporated usefulness of every adaptor to empower wireless services and security verification. The attributes of an Ad hoc wireless network are recorded as beneath:

  • All access points in the network operate independently and has own configuration file.

  • Access point is responsible for the encryption and decryption.

  • The network configuration is static and does not respond to changing network conditions.

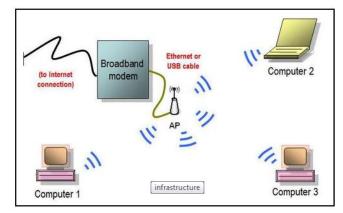Centrally Coordinated Architecture (Infrastructure mode)

Figure 4: Infrastructure mode

The other design in wireless network is centrally coordinated (infrastructure mode). All gadgets are associated with wireless network with the assistance of Access Point (AP). Wireless APs are typically routers or switches which are associated with web by broadband modem.

Infrastructure mode deployments are more suitable for larger organizations or facility. This kind of deployment helps to simplify network management, and allows the facility to address operational concerns. And resiliency is also assured while more users can get connected to the network subsequently.

An infrastructure mode wireless network has the characteristics as below:

  • The wireless centralized controller coordinates the activity of access point.

  • The controller is able to monitor and control the wireless network by automatically reconfiguring the access point parameters in order to maintain the health of the network.

  • The wireless network can be easily expanded or reduced by adding or removing access points and the network can be reconfigured by the controller based on the changes in RF footprint.

  • Tasks such as user authentication, fault tolerance, control of configuration, policy enforcement and expansion of network are done by the wireless network controller.

  • Redundant access points can be deployed in separate locations to maintain control in the event of an access point or switch failure.

V. SIMULATION

Simulation is the way toward learning by doing. At whatever point there is something new on the planet, we endeavor to break down it first by inspecting it and in the process get the chance to get familiar with a ton of things. This whole course is called as Simulation.

673

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Relating to this procedure, so as to see every one of the complexities one have to show the whole pretend in type of computer simulation, the need is to manufacture fake items and dole out them jobs powerfully.

Computer simulation is the structuring of a hypothetical physical framework on a digital computer with emphasis on model planning, execution and investigation. After production of the mathematical model the most critical advance is to make a PC program for refreshing the state and occasion factors through time (by time slicing or event scheduling). In the event that this reenactment is done progressively in parallel computers, it is called Parallel or Distributed simulation [6].

VI. FEATURES OF NS2

Network Simulator (Version 2), broadly known as NS2, is basically an event-driven simulation tool that has demonstrated valuable in dynamic the dynamic idea of correspondence systems. Simulation of wired just as wireless system capacities and protocols (e.g., routing calculations, TCP, UDP) should be possible utilizing NS2. When all is said in done, NS2 furnishes clients with a method for indicating such network protocols and simulating their comparing practices [5].

NS2 can be utilized in most unix frameworks and windows. The greater part of the NS2 code is in C++. It utilizes TCL as its scripting language, Otcl adds object introduction to TCL.NS(version 2) is an object oriented, discrete event driven network simulator test system that is unreservedly conveyed and open source.

NS-2 can be utilized to actualize network protocols, for example, TCP and UPD, traffic source conduct, for example, FTP, Telnet, Web, CBR and VBR, switch line the executives component, for example, Drop Tail, RED and CBQ, directing calculations and some more. In ns2, C++ is utilized for point by point convention execution and Otcl is utilized for the setup. The compiled C++ objects are made accessible to the Otcl translator and along these lines, the instant C++ items can be controlled from the OTcl level.

Traffic Models: CBR, VBR, Web etc

Protocols: TCP, UDP, HTTP, Routing algorithms,MAC etc

Error Models: Uniform, bursty etc

Misc: Radio propagation, Mobility models , Energy Models
Topology Generation tools

Visualization tools (NAM), Tracing

VII. HISTORY OF NS2

- Start 1989 as a variant of REAL (network simulator for studying the dynamic behavior of flow and congestion control schemes in packet-switched data networks)
- After 1995, Funding from DARPA through many projects (VINT project at LBL, Xerox PARC, UCB, USC/ISI. SAMAN and NSF with CONSER)

- NS2 includes many Contributions, e.g. from other researchers, wireless code from the UCB Daedelus and CMU Monarch projects and Sun Microsystems

VIII. BASIC ARCHITECTURE

NS2 comprises of two key languages: C++ and Object-oriented Tool Command Language (OTcl). While the C++ characterizes the interior system (i.e., a backend) of the simulation objects, the OTcl sets up simulation by assembling and configuring the objects just as planning discrete events. The C++ and the OTcl are connected together utilizing TclCL.
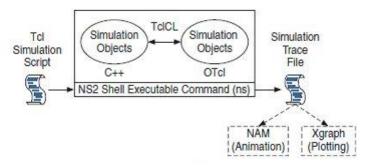

Figure 5: Basic architecture of NS2

IX. SIMULATION WITH NS2

- Define objects of simulation.
- Connect the objects to each other
- Start the source applications. Packets are then created and are transmitted through network.
- Exit the simulator after a certain fixed time.

X. CONCLUSION

Wireless networks empower different gadgets to utilize a similar web association remotely, just as offer records and different assets. Network simulation(NS) is one of the sorts of simulation, which is utilized to simulate the systems, for example, in MANETs, VANETs and so forth. It gives simulation to routing and multicast protocolss for both wired and wireless networks.

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