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Research on Channel Allocation Algorithm in Centralized WLAN Network

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Abstract. Currently, the Internet is to get rid of the shackles of the PC and step into the era of free mobile-Mobile Internet will drive the development of mobile data services, and provide a vast new space for the continued growth of the mobile communications. To reduce the number of inter-disturb access points and the interference among access points in same channel, with research on interference issues and channel assignment algorithms of wireless local area network, a scheme suitable for centralized wireless local area network was proposed aiming to minimize the total interference among access points, which comprehensively considerate the number of neighbor and the received power, Finally, it describes how to set up a WLAN system-level simulation platform, and how to design a simulation scenario.

Introduction

Based on IEEE 802. 11 protocol for wireless local area network access point, AP default channel set to the same fixed value, in the case of densely deployed access points will be formed between the adjacent access points strong co-channel interference, resulting in increased frequency network transmission failure, the overall throughput loss and other problems. Many scholars have proposed a large number of algorithms for channel adjustment. These algorithms are divided into two types: the static allocation method and the dynamic allocation method.

Part of a static allocation algorithm of channel assignment as network planning, AP Location allocation and channel allocation tends to be considered comprehensive, static allocation algorithm Is divided into the following two categories.

(1)the traditional algorithm, Integer Linear Programming (ILP) algorithm, Priority-Map algorithm, Patching algorithm, Coverage-Oriented algorithm (1); This algorithm requires AP pre position, and the characteristics of wireless LANs is It provides rapid deployment, whenever and wherever possible the establishment and revocation, so flexibility party The deletion greatly influence the application scope of the channel adjustment algorithm. Class DSATUR algorithm, CFAssign-RaC algorithm, Measurement-Based algorithm class. This algorithm does not require the AP pre position, but in the process of collecting information need to exchange their configuration information between a large numbers of AP, increase the network instruction overhead, while causing the storage and computation burden is very heavy on the AP node.

(2)Dynamic adjustment mode is the mode of distribution a follow network status timely adjust channel, with quick feedback on the changes of the flexibility in the distribution network, etc. The typical algorithms such as: LCCS algorithms, Min Max algorithms, Hminmax/Hsum algorithm, Pick-Rand and class Pick-First algorithm. The above on algorithm respectively according to the channel load, channel utilization ratio, the amount of interference to adjust channel.

The proposed algorithm in this paper is on the centralized architecture, the status of the AP Information collection, storage and processing of unified, real-time monitoring of network status. Change, through the dynamic allocation of channels, the number of neighbors to minimize all AP And the sum total interference, and achieve load balance between channels.

Channel Adjustment Algorithm

Algorithm Scheme. The whole network using wireless local area network architecture of centralized access point (access, point, AP) directly or through the two layer (layer three switch) and a centralized equipment (AP controller, AC) connected, dynamic channel adjustment algorithm running in AC. Between AC and many AP through the CAPWAP communication protocol (11), AC may be useful for each AP in the network working state and the adjustment results are monitored, every information collection cycle, then control the tunnel through the CAPWAP, the information collection instructions to each AP, each AP in turn to collect its neighbor information (neighbor AP name, accept power), these information through data tunnel upload to AC information collecting and sorting, constructed by AC related data structure to maintain global network information.

Every channel adjustment cycle or the current state of the network (network topology, AP interference etc.) changes, AC will collect and read the global state information, the implementation of the channel adjustment algorithm, channel adjustment decision that every AP, through the CAPWAP control of the tunnel will be issued to the corresponding decision AP, AP Executive issued the decision, to adjust its channel.

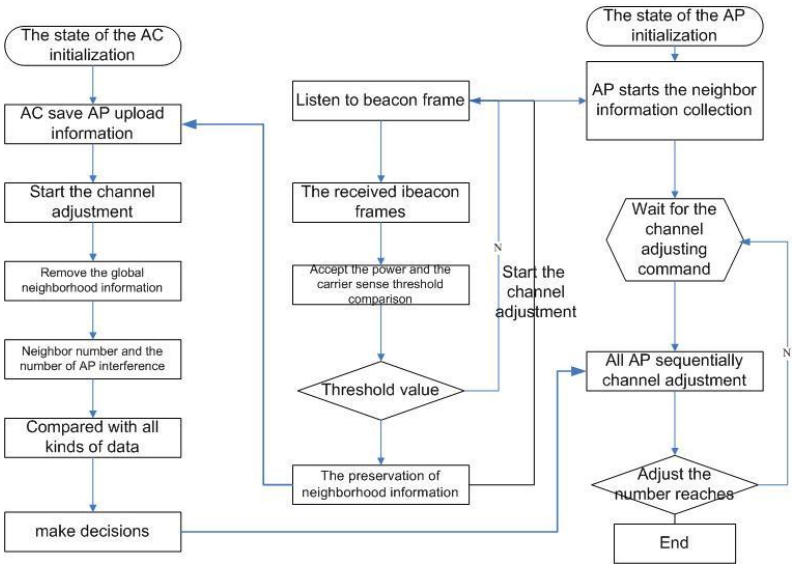

Figure 1. Algorithm-step process

The Algorithmic Steps. As shown in Figure 1, each AP will carry the beacon frame has its own information Are transmitted in each channel, at the same time in each channel polling interception of their week Edge network state, the AP generated in each channel neighbor relation table, this table package Contains: the AP neighbor what are the AP and the AP receives the adjacent AP The signal power issued. AC collects neighbor relation table for each AP, table The number of neighbors is refers to the AP can get a sense of how much AP, indicating the AP Be how much AP interference, accept the total power is used to indicate that the AP by phase Degree of adjacent AP signal interference, these 2 indicators is the dynamic channel adjustment An important criterion for the whole.

Running the Algorithm Requires the Following Parameters

Channel set the initial channel CH_ INIT: AP of the initial.

CH_ AIM: channel target channel AP node will be adjusted to.

The channel marker FLAG: distinction AP channel issued beacon frame work for channel (FLAG 1) or detection channel (FLAG 0).

The signal power received Beacon frame power Pr: AP received from the AP of the adjacent.

Neighbor number NEI_ NUM: according to the Beacon frame to the monitor to accumulate.

The number of REV_ NEI_ NUM: AC reverse neighbor according to reverse the neighbor table to calculate.

Accept the power sum SUM_ PR: according to the neighbour relation table calculated.

Reverse acceptance power sum SUM_ REV_PR: calculated according to the reverse neighbor relation table has been.

Neighbor number threshold NEI_ NUM_ MAX: for all AP NEI_NUM averaging (rounded down) to get.

Accept the power sum threshold SUM_ PR_ MAX: for all AP SUM_ PR are worth to take.

The number of times Ci:APi channel adjustment for continuous channel adjustment.

Threshold channel adjustment of Ci number of channel adjustment times threshold of R: AP.

The algorithm operation period of T: by the whole network information collection, summary, and algorithm of decision and execution of time-consuming sum to determine.

Simulation Experiment

The experimental parameter settings

Acceptance threshold value parameter AP transmit power and signal, if not set, NS2 will use default parameter values, these values are defined in the ns-default.tcl file, NS2 will be initialized to 10 times: CPThresh, RXThresh 3.652e-10W, Pt 0.28183815W. Transmission model, physical layer, MAC layer protocol, interface queue, link layer, the antenna parameters such as the type, by TCL script settings, part TCL code as follows:

```
set val  ( chan)        Channel/WirelessChannel
set val  ( prop)         Propagation /Two RayGround
set val  ( netif)        Phy /WirelessPhy
set val  ( mac)          Mac /802_11
set val  ( ifq)          Queue /DropTail
set val  ( ll)           LL
set val ( ant)           Antenna /OmniAntenna
set val  ( ifqlen)       50
set val  ( rp)           DumbAgent
```

Other such as channel adjustment cycle, number of neighbors, the channel, to receive power and other parameters, the initialization in the channel adjustment algorithm code, part of the C + + code as follows:

= 60; CH_ INIT = 1; CH_ AIM = 1; NEI_ NUM= 0;REV_ NEI_ NUM = 0; SUM_ PR= 0;REV_ SUM_ PR= 0;

The circles represent the wireless transmission range of AP, the initial state of all the AP using channel 1, through the global information collection and processing, AC can obtain the whole network state, for dynamic channel allocation on AP.

Experiment 1: As shown in Figure 2, algorithm of dynamic adjustment of AP2 and AP3 to Channel6 and channel11, AP2 and AP3 channel adjustment reduces the adjacent AP signal and interference competition exists, the number of AP 3 channel was 1, to achieve a balanced distribution of AP in channels.

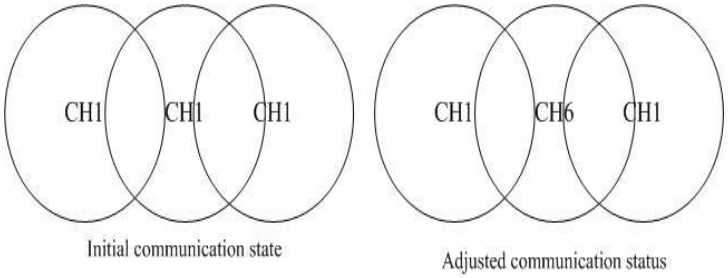

Figure 2. Dynamic channel emulation effect adjustment

As shown in Fig. 3, algorithm of dynamic adjustment of AP2 and AP3 to Channel6 and channel11, AP2 and AP3 channel adjustment reduces the adjacent AP signal and interference competition exists,

the number of AP 3 channel respectively: 2, 1 and 1, to achieve a balanced distribution of AP in channels.

Experiment 2:

As shown in Fig. 4, the algorithm of dynamic adjustment to the new added AP, channel adjustment of the AP reduced the AP adjacent signals with the same frequency interference competition and existence, the number of AP 3 channel was 3, to achieve a balanced distribution of AP in channels.

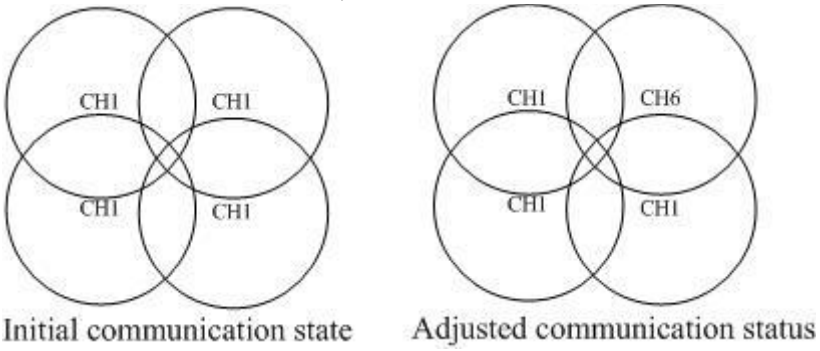

Figure 3. Dynamic channel emulation effect adjustment

Experiment 3: Based on Experiment 2 adjustment of the end on the new increase of 5 AP, and the original 4 AP is the three rows and three columns.

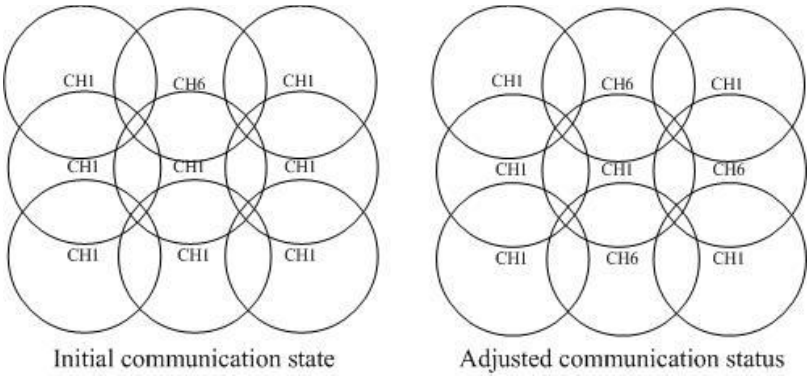

Figure 4. Dynamic channel emulation effect adjustment

Conclusions

In this paper, we study on the interference problem of "AP" in WLAN intensive deployment. On the whole the studying all kinds of algorithms, we propose a dynamic channel allocation algorithm for centralized WLAN architecture. This algorithm can reduce the storage and computation burden of AP. without predictable location of the AP, the channel can be adjusted in a timely manner according to changes in network conditions, reducing interference between AP at the same time, implemented based on the number of the channel between the AP load balancing, NS2 simulation results on show that the algorithm is simple and effective.

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